

THE
PROCEEDINGS
OF THE
ENTOMOLOGICAL SOCIETY
OF
LONDON
1920.

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FOR THE YEAR 1920.

Wednesday, February 4th, 1920.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

Election of Fellows.

MISS WINIFRED E. BRESCHELEY, D.Sc., F.L.S., Rothamsted Experimental Station, Harpenden, Herts; Messrs. ALFRED ELLIS BERRAS, 3, Cornbaght Road, North End, Portsmouth; ALBERT ERNEST HODGE, 11, Astonville Street, Southfields, S.W. 18; Rev. MELVILLE JONES, 16, New Bridge Street, E.C. 4, and Hope Fountain, Box 283, Bulwayo, Rhodesia; Messrs. GEORGE BEDDOME CURTIS LEMAN, GEORGE CURTIS LEMAN, SYDNEY CURTIS LEMAN, Wynyard, 152, West Hill, Putney Heath, S.W. 15; and FRANK REGINALD MASON, Oxford, Harpenden, Herts, were elected Fellows of the Society.

Nomination of Vice-Presidents.

The PRESIDENT announced that he had nominated Dr. A. D. IMMS, the Rt. Honble. Lord ROTHSCHILD and Mr. W. G. SHELDON as Vice-Presidents for the ensuing session.

PROC. ENT. SOC. LOND., 1, II, 1920.

A

Exhibitions.

THE PROTECTIVE MOVEMENTS OF THE CONSPICUOUS LARVA OF THE CATOCHALINE MOTH, *COCYTODES COERULEA*, GUÉR.—Prof. POULTON exhibited the coloured figure referred to in the following record by Mr. H. W. Simmonds of Waidoi, between Suva and Navua, Viti Levu, Fiji; also the moth bred from one of the larvae by the same naturalist.

Oct. 18, 1919.—"I enclose a drawing of the larva of a moth, one of three I found on a bush. When the bush was approached it lashed its anterior segments violently from side to side in a most alarming manner, shaking the whole branch violently. I had a couple of weeks earlier noticed these three larvae, then small, feeding in company with about 40 or 50 others of a different species. Some three hours later the whole of these latter had disappeared and only the three remained. A company of wax-eyes in the adjoining forest suggested the cause. I am pretty confident that if the three larvae had been as big as they were on my next visit no bird would have dared to approach it, and both species would have escaped."

MOTHS FLYING, BUT NOT AT REST, CAPTURED BY BATS.—Prof. POULTON drew attention to an observation by Mr. W. Feather at Kibwezi, B.E. Africa:—

Feb. 1, 1920.—"I was much interested in watching the bats flying in the room and taking moths, mainly *Cyrtogramma latona*, Cram., and *limacina*, Guér. As long as the moths were on the wing the bats caught them, but immediately they came to rest on the walls or ceiling they were quite safe, the bats, although flying past them quite close, never attempting to take them. It seems as if the bats can only recognise moths when on the wing."

MUSCA AUTUMNALIS, DE G. (CORVINA, F.), HYBERNATING IN A LOFT AT ST. HELENS, ISLE OF WIGHT, AS IN 1914-15 AND 1917-18.—Prof. POULTON said that he had visited the loft on Dec. 16, 1919, and found one long narrow patch of many hundred flies and another small one of several dozen. A few were swept by hand from the former patch into a small box, and, when examined, were found to consist of 11 ♂ and

24 ♀ of *M. autumnalis*. Spider's web was far more evident than in previous years and perhaps pointed to the reason for the lessened number of the flies. The position of the groups was as described in Proc. Ent. Soc., 1915, p. xxi, and 1918, p. xxii, where it was also recorded that the females were far more numerous than the males.

OPHION UNDULATUS, GRAY., BRED FROM BOMBYX QUERCUS, L., COCOONS, FROM N. STAFFORDSHIRE.—Prof. POULTON exhibited six examples of this fine Ichneumonid, said by Mr. Claude Morley to be common neither here nor on the continent ("Brit. Ichneumons," vol. v, *Ophioninae*, p. 279). The specimens were bred by Mr. F. C. Woodforde and appeared in following order:—1918, June 11—1 ♂, June 21—3 ♀; 1919, June 12—1 ♂, 1 ♀. The first was from *B. quercus*, the others from the var. *callunae*, Palmer. The cocoons were from wild larvae, those of the first four from the Burnt Woods, Market Drayton, of the last two from Ashley Heath in the same district.

OBSERVATIONS ON THE RED (GREGORYI, DIST.) AND GREEN (SPECIOSA, MELICH.) FORMS OF THE HOMOPTERON ITYRAEA NIGROCINCTA, WALK., AT KIBWEZI, B.E. AFRICA.—Prof. POULTON said that, after receiving the specimens exhibited at a previous meeting (Proc. Ent. Soc., 1918, p. lxxviii), he had written to Mr. W. Feather at Kibwezi, suggesting that it would be interesting to watch a particular set of nymphs, so as to determine whether the imagines emerged in batches of each colour. Although this point was not definitely settled, the following observations recorded by Mr. Feather, who had recently returned to this country, were of much interest. In bringing them forward a fine series of specimens collected Dec. 1–14, 1918, by the same naturalist, was also exhibited to the meeting:—

Plant No. 1.

1918.

- " June 4.—Four branches 9 ft. from ground, ends covered with nymphs.
 " 5.—No change.
 " 10.—Very few nymphs. No imagines.

Plant No. 2 (5 ft. high).

1918.

- " June 1. About 10 imagines - all red.
 " 5. About 15 imagines - all red.
 " 10. - All imagines gone.

Plant No. 3 (6 ft. high).

- " June 4. At the top 4 red imagines, then 1 green; below this again about 20 green followed by about 50 nymphs.
 " 5. - At the top 5 red with 2 nymphs in the midst of them, below 2 green followed by nymphs.
 " 10. - Red imagines and nymphs intermixed, with 1 green imago in the middle of them.

" On June 11 I had to go away and did not return for 10 days, when I found they had all disappeared."

In a letter of Feb. 1, 1920, Mr. Feather included further observations on the insect :-

" The nymphs occur in fairly large numbers on one bush, say from 50 to 250, and in a couple of hundred yards I have counted 32 bushes bearing them. They are often found in clusters on the underside of the leaves. This also applies to the imagines. I have seen some hundreds of branches with imagines on them, but have not been fortunate enough to see one with all green at the top. I have seen them with, say, one green at top, then a few red, then green again, red, and so on, in many varying ways."

Mr. A. Loveridge's observations at Morogoro (Morogoro) in ex-G.E. Africa agreed precisely with those of Mr. Feather.

The arrangement observed in Mr. Feather's Nos. 2 and 3 supported the conclusion that the forms emerge in batches or waves, and it followed that sometimes the order would be that which produces likeness to a flowering spike with green buds at the top. Considering its evident rarity and in view of Mr. Feather's observations, Prof. Poulton now believed that this flower-like arrangement was an accidental result which was bound to happen from time to time. This conclusion was also supported by the fact that the species

appeared to be markedly gregarious and therefore unlikely to adopt a highly specialised form of Protective Resemblance.

EXOTIC RHOPALOCERA. - Mr. G. TALBOT exhibited the following species on behalf of Mr. J. J. JOUCEY :

Dasyophthalma zuzina, Golt. A melanic aberration of the female in which the bands are only present as vestiges.

Papilio ridleguani, White. Dark aberrations of the male in which the red spots of the fore-wing are obscured by dark scaling. In one specimen most of the scales on these spots are black with some red ones intermixed. In this specimen the hind-wing is also very dark. These aberrations seem to correspond to the female forms of *Acraca egina* and *zetes*, and of *Pseudacraea trimeni*, with which the *Papilio* is associated. This dark aberration has received the name of *junata*, Niep.

Papilio phidias, Oh. A ♂ example of this very rare and extraordinary species from Tonkin. This species forms a link with the tailed *antiphates* and *aridens* forms and the tailless *maeurens* forms. It enters into the mimetic group with Danaine pattern. There are 3 ♂♂ in the Coll. of Oberthür, 2 ♂♂ in the Paris Museum, and 2 ♂♂ in the Joicey Coll. The latter are from Tonkin, and the others from Annam. The ♀ is unknown.

Heliconius from Matto Grosso : -

1. A distinct form of *cleverus*, Nodd., probably undescribed and connecting this form with *bari*, Oh. The pattern of both wings is very similar to *bari*, but there are no apical spots on the fore-wing. In this it differs from *tamatawari*, Kaye. The two forms of *bari* occur in the Guianas, whilst *cleverus* occurs in Bolivia, Upper Amazon and Peru.

2. A species of *melanoneue theliope* from Para, showing its great likeness to the *cleverus* form.

3. Form of *melanoneue punctum*, Stgr. There are five forms.

- (a) Fore-wing with much-reduced yellow band and no spot in the cell. Very similar to a specimen of *theliope* from the Lower Amazons.
- (b) Fore-wing with yellow patch. The typical form, occurring also in Bolivia.

- (c) Fore-wing with typical yellow patch, also a specimen with band as in (a). In the distal area next to the yellow band is a narrow red band as seen in some *melpomene* from Guiana.
- (d) Fore-wing with a red patch and yellow costal spot. Hind-wing with a yellow transverse band. This is a very good mimic of the *erato* form *anacreon*, Gr.-Sm., from Bolivia. It is similar to *penelamanda*, Stgr.
- (e) Fore-wing similar to (c), but the red band more pronounced and discal patch broken up into small spots. Hind-wing with a yellow band which is distally powdered with red.

4. Forms of *melpomene amandus*, Gr.-Sm. One specimen approaches *nanna*, Stich., from S. Brazil, in the yellow median stripe on fore-wing and the longer yellow band on hind-wing.

5. *H. erato phyllis*, Fbr. This form chiefly resembles the *amandus* form above.

6. A form of *erato phyllis* which resembles the *hydara* race. This is probably new.

7. A form of *erato* similar to the *erythraea* form from Guiana. The hind-wing bears a yellow discal spot, and there is some yellow scaling on the inside edge of the red band in the fore-wing.

8. A form of *erato* near *ottonis*, Riff.

9. A form of *erato* near *tellus*, Ob., with a yellow discal spot on the hind-wing.

10. A series of *erato tellus*, Ob., showing variation in the yellow patch of fore-wing similar to what is seen in specimens of this form from French Guiana. A similar variation occurs in the red form *erythraea*, Cram. The general tendency, however, in Matto Grosso *Heliconius* is for the fore-wing patch to have the spots united, whilst in those from French Guiana we find the breaking up of this patch a common variation. In other species from Matto Grosso which have a yellow fore-wing patch, the tendency to contracted spots is still the same.

11. *H. xanthocles melete*, Feld. A form with the yellow

patch showing a larger black spot than in typical specimens from Upper Amazons and Peru.

12. A form of *aeole* showing condensed yellow patch in fore-wing, and thereby exhibiting a transition to *ustydania*, Erichs.

13. *Eueides*, sp. nov., allied to *eucidina*, Ob., also shown. It is remarkable that another species of this curious group of *Eueides* should turn up in Matto Grosso. In comparison with the French Guiana species, this one has the yellow spots of the fore-wing closer together, and the hind-wing has typical *erato* flame streaks. It bears a close resemblance to some specimens of *erato tellus*.

The ♀ is not unlike the ♀ of the Guiana species. The difference between the sexes, which is unusual in *Heliconius*, indicates some biological necessity, and probably shows that the species belongs to a group apart from *Heliconius*.

Mr. Kaye assigned *eucidina* to *Eueides*, Oberthür having placed it in *Heliconius*.

It is evident that the Matto Grosso district around Cuyaba would yield some very interesting results in *Heliconius* if a large collection were made.

The fore-wing patch of both *melpomene* and *erato* begins to break up into spots in the various areas of distribution of these species proceeding from the Andes to the lower levels of the Amazon basin and the coast. It must be noted, however, that in French Guiana, as in British Guiana, typical *melpomene* far exceeds in numbers the various aberrations which are known to occur with it. The large number of forms of *melpomene* and *erato* received from French Guiana, and partly dealt with by Mr. Kaye in the transactions of this Society, was the result of special collecting initiated by a well-known Paris dealer in a manner calculated to make the most of its commercial possibilities.

EUROPEAN ORTHOPTERA.—Lieut. E. B. ASHBY exhibited the following species:—

Forficula auricularia, L., Arquata Scrivia. *Acrida nasuta*, L.; 11 males and 5 females; River Stura, Turin. *Stauroderus bicolor*, Char.; Vicenza, Turin, and Arquata Scrivia. *Chorthippus* (*Stenobothrus*) *dorsatus* Zett.; River Stura, Turin.

Eupacornia thalassina, Fabr.; River Stura and River Sangone, Turin. *Pachytylus danicus*, L. (*cinerascens*, Fabr.); River Stura, Turin, and River Scrivia, Arquata Scrivia. *Oedipoda miniata*, Pall.; Arquata Scrivia, and Aigle, Rhone Valley. *Oe. caeruleascens*, L.; Sassi; River Sangone; River Stura (all environs of Turin), and Arquata Scrivia.

LARVA AND PUPA OF A MORPHO.—MR. HY. J. TURNER exhibited a tinted photograph of the larval habit of assembly, when not feeding, of *Morpho laertes* (?) sent to him by Mr. F. Lindeman of São Paulo, Brazil, and also a coloured photograph of the pupa *in situ* showing its close protective resemblance, and read the following note from his correspondent.

“Nov. 18, 1919.

“I have a good number of caterpillars feeding; the most interesting are a bunch of the larvae of some *Morpho*—probably a local form of *M. laertes*. I think, about the most beautiful caterpillars I have seen. I found them in two colonies, one of about ten and the other about thirty, all sitting together. At first I thought it was a beautiful orchid flower (and this is undoubtedly the impression they try to give). They had already changed their skin for the last time, and were about $\frac{3}{4}$ of an inch thick and about three inches long. The predominant colour is bright red—like red velvet—but on closer examination they have also deep yellow, blue and white. I have tried to make a painting of one; but I think it defies my skill, so I am resorting to the camera. They spin all over a leaf, and sit on it altogether—they make quite sure that the leaf can't fall off by spinning it securely on to the branch. At night they eat, and the next day you find them in exactly the same place again; in fact, if you hadn't seen them feeding at night (and to do this they, of course, separate) you would think they hadn't moved. When changing their food I always leave their spun-over leaf (their house)—and I have had them three weeks and they still inhabit the same house. The leaf drying up doesn't worry them; in fact, I found them on a dried-up leaf. A gentleman here, who has collected many years, told me it was useless trying to feed *Morpho* caterpillars in captivity as they always sat in a corner in the cage or ran

about away from the food; but this only happens when you take their house away from them when changing their food."

" Dec. 21, 1919.

" Only one of my *Morpha* caterpillars died, all the rest have turned into chrysalids. I found them in two bunches, one of 11 and the other of 22, but 7 or 8 of the chrysalids went black a couple of days after turning. I have opened two of these, but can't find any signs of ichneumon 'grugs' inside. The first caterpillar when it wanted to turn crawled under some paper I had put into the bottom of the cage to facilitate cleaning - a place where it had no room to turn in. So after that I pasted a 3" strip of paper round the top of the cage on the outside so as to darken it, and after that they mostly suspended themselves from the top of the cage, except a few that suspended from the leaves of the food. When I found them most of them had changed their skin for the last time, and they fed for five or six weeks after that. I enclose a photo of a group which will give you a fair idea of what they are like. Unfortunately I could not get a panchromatic plate, which would have brought out better the different shades of colouring. The first chrysalis is now changing colour, and will probably come out during the next week."

SOME ITALIAN RACES OF *ZYGAEVA TRANSALPINA*. Esp. - Mr. H. J. TURNER also exhibited several races of the very variable *Zygæva transalpina* from peninsular Italy, sent to him by Signor Querci, and stated the relationship of the various forms as explained by Dr. Verity of Florence. He said:

" Dr. Verity identifies the *Z. loti* of Esper with the somewhat later-described *Z. transalpina* of the same author, the former being of small size, and comparatively frail build with much extent of red scaling on the underside of the fore-wing, made up of the group of Central European races; the latter of comparatively larger size and stout build without the red scaling on the underside of the fore-wings, made up of the group of more brilliantly coloured races of Italy south of the river Po.

" The race of the Alps and Pyrenees, called *alpina* by M. Oberthür, Dr. Verity calls *alpicola*. In the Po valley and the lower localities of the Alps there is a somewhat more robust

and brighter race he calls *emendata*. Both of these by their red scaling below and other comparative characters belong to the *loti* group.

"The races to the south of these areas Dr. Verity divides into two groups, a mountain group and a maritime group, differing again comparatively in build, brilliancy of colour and size. Along the tops of the Apennines from Liguria to the Abruzzi there is a race of small specimens named *altitudinaria* by Count Turati, frail, narrow wings, thin antennae, etc. Below this race in altitude and intermediate between the *emendata* of the *loti* group and *altitudinaria* in comparative characters is the race *intermedia* of Rocci, which occurs on the low foot-hills of the Apennines; these races produce but few extreme individuals, they are all six-spotted with but little extension of the black border of the hind-wing.

"Further south melanism is strongly developed and even becomes racial. In the Sorrento Peninsula occurs the race *sorrentina*, Stgr., with the predominance of forms having broad or very broad black margins to the hind-wings, often with rays towards the dorsal margin, with occasional five-spotted forms, occasionally with the whole hind-wing darkened, and a few of the yellow spotted *calabrica*. In the Mainarde Mts. at Villa-latina occurs a beautiful race distinct and peculiar in its variation in a large proportion of its specimens by the red becoming pink or yellow. To this race Dr. Verity gives the name *latina*.

"Of the other group there are two races (1) *maritima*, Obth., like *emendata* but brighter and without the red scaling below, and occurring along the Rivieran coast to Genoa, and (2) a very similar race called *transiens* by Rocci, occurring along the coasts further south and at Formia in Caserta producing dark specimens closely approaching the neighbouring race *sorrentina*."

He also questioned whether the relationship of the forms as at present suggested would stand, when the races occurring in other parts of the peninsula had been studied.

Lord ROTHSCHILD observed that the same range of variation was exhibited in *Z. ephialtes*.

AN AUTOGRAPH OF CHARLES DARWIN.—The Rev. F. D.

MORICE exhibited a book of Charles Darwin's ("Descent of Man") given by the author "with kind regards" (autograph) to the late Mr. Roland Trimen.

REMARKABLE DEVELOPMENT IN HIND LEG OF A FEMALE BEE.
—Mr. MORICE also called attention to the very abnormally developed hind-legs of a ♀ bee of the genus *Megachile* from Mesopotamia, apparently belonging to a section of the genus in which no character at all similar had yet been described in either sex. He did not feel able to say for certain whether the character was specific, or a case of monstrosity, but at present inclined towards the former opinion.

ABERRANT PLUSIAS.—Lord ROTHSCHILD exhibited two aberrant specimens of the genus *Plusia* in which remarkable aberration is very unusual. The one was a specimen of *P. gamma* with deep purplish suffusion, ab. *purpurissa*, Warr., the other a beautiful example of *P. pulchrina* taken near Gloucester, June 21, 1919, by Mr. C. G. Clutterbuck, in which the usual golden Y mark was replaced by a large wedge-shaped golden blotch, the space between the hind-margin and the subterminal line being of a beautiful pink shade.

EAST AFRICAN FLATIDAE.—Dr. C. J. GAHAN exhibited specimens of the East African Flatidae named *Ityraea patricia*, Melich., *I. speciosa*, Melich., *I. electa*, Melich., and *I. gregoryi*, Dist., and said he believed them to be all forms of the South African species *Ityraea nigrocincta*, Walk., with which they agreed in structural characters. In a very large series of specimens captured by Mr. Loveridge at Morogoro, three of these forms were represented, the one named *patricia* being the most abundant; and specimens of the latter had been taken *in cop.* with *speciosa*. *Ityraea gregoryi*, which was not found at Morogoro, appears to be the predominant form farther north, as, for example, at Kibwesi and in other parts of British East Africa, there taking the place of *patricia*. In all of these forms, the tegmina are more or less distinctly margined with black and show a short transverse streak of varying length running inwards from the margin at the apex of the clavus. *I. patricia* may be distinguished from the other forms by its three-coloured tegmina, which are red at the base, pale bluish green (or blue in the living insect) in the middle, and pale yellow

in the hinder third. In *I. gregoryi*, the tegmina are bright red at the base, and orange red over the rest of their surface, in this respect differing from those of *nigrocincta* in which they are of a pale yellowish tint passing to orange yellow at the base. The black margin is also more distinct in the latter form. In *I. speciosa*, the tegmina, except for a reddish border running alongside the narrow black margin, an orange-yellow spot alongside their scutellar edge, and one or two reddish spots between this and the black transverse bar at the apex of the clavi, are entirely green or yellowish green; and the head, pronotum and scutellum are also green. *I. electa* differs from *speciosa*, which it otherwise very closely resembles, in having the head, pronotum, scutellum, and base of the tegmina, reddish yellow. In both of these forms, the hind-wings are carmine red at the base, whereas in *patricia* they are entirely milk-white, and in *nigrocincta* and *gregoryi* are tinted, but only to a slight extent, with yellow at the base.

AN INTERESTING RELIC. Mr. DURRANT exhibited the original MS., dated Sept. 28th, 1851, of Lord Walsingham's earliest entomological "discovery" at the age of eight. It reads as follows:—

"I have just found out that the caterpillars hind feet are different to its front ones."

Wednesday, March 3rd, 1920.

Comm. J. J. WALKER, M.A., B.N., F.L.S., President, in the Chair.

Election of Fellows.

Messrs. E. H. BLACKMORE, President of the British Columbia Entomological Society, P.O. Box 221, Victoria, B.C.; ERNEST HARGREAVES, Zoological Dept., Imperial College of Science, South Kensington, S.W. 7; ARTHUR LOVERIDGE, Nairobi, British East Africa; and JOHN GEORGE RHYNEHART, Harris-town, Taghmon, Co. Wexford, were elected Fellows of the Society.

Proposed Alteration of the Bye-Laws.

It was announced that a Special Meeting would be called to consider alterations in the Bye-laws proposed by the Council, and these were then read for the first time. Mr. BETUNE-BAKER proposed that as the first possible opportunity for calling a Special Meeting would be immediately after the ordinary meeting in April, which falls in Easter-week, the Special Meeting should be held immediately before the ordinary meeting on May 5th; this was seconded by Dr. Marshall and carried.

Death of a Fellow.

The PRESIDENT announced the death of Dr. GORDON HEWITT.

Nomination for Fellowship of the Royal Society.

He also announced that Dr. R. C. L. PERKINS has been nominated for a Fellowship of the Royal Society.

Exhibitions.

SEASONAL DIMORPHISM IN ANDROCONIA. —Dr. F. A. DIXEY exhibited some outline drawings showing variation in form between the scent-scales of the spring and summer form of certain butterflies, and remarked on them as follows:—

"In the year 1901, when I was working at the scent-scales of the *Pierinae*, I noticed that the plumes of the wet-season form of *Teracolus eragore antigone*, Boisl., differed from those of the dry-season form of the same species. I made drawings at the time of the respective forms; these have not hitherto been published, but in my presidential address in 1910 I referred to this observation in the following words "The scale [of *T. antigone*] appears to be longer and narrower in the wet-season form than in the dry" (Proc. Ent. Soc. Lond., 1909, p. cii).

"Mr. F. J. Ball, of Brussels, has lately called my attention to the fact that in a paper published in 1914 ('Annales de la Société Entomologique de Belgique,' 1914, p. 170) he has described and figured many instances of a similar seasonal variation in the androconia of European butterflies belonging to the *Lycæniinae*, *Pierinae* and *Satyrinae*. The first observation in the case of a *Lycænid* was made by Dr. Chapman, who

found that the androconia of the first brood of *Agriades thersites*, Cantr., differed from those of the second brood in being broader, and containing more rows of points or 'globules' (Trans. Ent. Soc. Lond., 1914, p. 309, Pl. LIV). The investigation of these structures has been extended by Mr. Ball to many other species of the subfamilies named, with results that are carefully recorded in his paper. In *G. rapae*, Linn., the summer brood has a plumule which is broader in its proximal and narrower in its distal part than that of the brood emerging in the spring; the 'terminal chevron,' as Ball calls the distal margin of the scale from which the fimbriae arise, is more elongated in the former than in the latter. The same differences occur in *G. napi*, Linn.

"The outline drawings I exhibit are roughly copied from Mr. Ball's figures. His plates in the Brussels 'Annales' contain representations of the seasonal forms of plume-scales in *Symphleodaphnice*, Linn., and also of the corresponding forms in *Pararge* and *Coenonympha* (*Satyrinae*) and *Lycaena*, *Cyaniris* and *Evers* (*Lycaeninae*)."

BUTTERFLIES FROM CYPRUS.—Mr. H. J. TURNER exhibited many of the Cyprian Butterflies with which his paper (read later in the evening) was concerned, and explained their characteristic features.

ODONATA FROM MACEDONIA.—Capt. J. WATERSTON exhibited a set of Macedonian Odonata and made the following remarks:—

The Dragonflies exhibited were collected by myself in 1917-1918, and annotated lists of them have been published in vols. li and lii of "The Entomologist." On the present occasion, it may be of interest to recall the leading facts in the history of one of the species now before you, viz. *Selysiotthemis nigra*, Lind. (Libellulidae), which to Entomologists of a quarter of a century ago was little more than a name.

Although its range, as determined by the existing records, is a wide one, the claim of this insect to be included in the fauna of Western Europe rests upon two old and isolated specimens alone. The original example, Van der Linden's type of *Libellula nigra*, described in 1825, was a male from Terracina, on the west coast of Italy. (It may be remarked, in passing, that

Van der Linden confused with our insect the superficially similar species *Sympetrum dayae*, Sulz.) The second example was an immature male from Catalonia. This was regarded by de Sélys-Longchamps as a new species of *Urothemis*, a genus to which he also referred Van der Linden's insect, and he described it in 1878 under the name of *Urothemis adrena*. After an interval of about twenty years, records began to multiply more rapidly, with the result that the true home of the species was found to lie further towards the East than was formerly suspected. Since 1897 Ris, the author of the monotypic genus *Selysiotthemis*, has extended the known distribution to the Kashgar Daria in the East and to the Algerian Sahara in the South, while Bartenel has furnished several records from Palaearctic Asia (the Caucasus, Turkestan, Persia, and Afghanistan).

I met with this insect in great numbers at two or three different localities in Macedonia, and, as my captures were made in circumstances which cannot be regarded as accidental, they confer upon the species a status in the European fauna which it could not derive from the two old and unconfirmed Mediterranean records. According to the information Morton has recently published, members of the British Expeditionary Force in Mesopotamia also found the species very commonly. In Mesopotamia, it would seem, *Selysiotthemis* is on the wing from April to June, while in August and September immature examples again appear. The individuals of the earlier batch, moreover, are larger. As it happened, the four specimens taken by myself in Macedonia in the third week of June were all females, and three of them were decidedly immature. The remaining specimens, six in number, were caught late in July or early in August, and all of them were fully adult. It is possible that the flight of this species, which evidently begins later in that country than in Mesopotamia, is continued without any interruption during the month of July. It remained on the wing until the end of August, at all events, but I have no record of its appearance in September. In respect of size, my specimens from Giol Ajak and Lake Adji Geul compare very favourably with those previously recorded.

Although no examples were secured, the species was again

common in August 1918 near Dragonir, along the east side of L. Ardair. All three localities are in Western Macedonia. I have no notes on *Selysiothecus* in the Struma Valley, where, however, it doubtless occurs. On the other hand, I looked for the species unsuccessfully along the Beshik-Langaza plain and round Stavros, May-June 1918.

The flight is low over dry ground especially when sparsely set with tufts of grass on which the insect often rests. Water surfaces, however, are generally avoided.

I have to thank my friend Mr. Herbert Campion for material assistance in drawing up the foregoing notes.

FORMS OF *HELICONIUS DORIS*.—Mr. W. J. KAYE exhibited *Heliconius doris*, Linn., from Trinidad, of the blue, green and red forms, and from Colombia a specimen of an *anathusia* form uniting the blue and red form in one, to show the disposition of the hind-wing streaking of the blue, green or red forms. The streaking of the two former always occurs along the vein; while the red form is always between the veins. The following note by Mr. W. Butin from Trinidad was read, and the comment was made that confirmation of such a remarkable observation was greatly to be desired.

"A female that was either green or blue was observed depositing eggs on upper surface of a leaf of *Passiflora edulis* in the afternoon at about 3-4 early in November; eggs were touching each other, and 129 were laid. Caterpillars emerged six days later. Caterpillars and pupae gregarious, unlike some other species of *Heliconius*; green and blue forms emerged in about equal numbers; from another batch of eggs laid on another leaf at the same time by the same female only red forms emerged."

LYCAENIDAE FROM CEYLON. Mr. RILEY exhibited some Lycaenids from Ceylon on behalf of Mr. W. ORMISTON of Kalupahani. The specimens included:

1. *Zizera lysimach*, Hb. A female with extra spots added irregularly on underside of fore-wing. A similar specimen has already been received by the B.M., also from Ceylon, and several others were taken by Mr. Ormiston at the same time.

2. *Zizera guika*, Trimen. A similar aberration, also a female and taken at the same place.

3. *Catochrysops pandura*, Horsf. ♀. From N. Ceylon. It differs considerably from the normal larger form with which Mr. Ormiston has taken it at Trincomali in Dec., 1918, and he considers it probably a distinct species. The series in the B.M. is too poor to attempt to decide this point.

4. *Syntarucus* (*Tarucus*) *telicanus* L. *plinius*, Fab. Aberration with coalescent spots.

5. *Nacaduba noreia*, Feld. ♀. This insect described by Felder in 1864 has never since been correctly determined. The name has usually been applied to the tailless form of *N. ardates*. The species here exhibited, however, seems without doubt to be the true *N. noreia*, Feld., with the description of which it very well agrees.

6. *Nacaduba dana*, de Nicé. ♂. Aberration with the markings of underside almost entirely absent.

7. *Nacaduba atrata*, Horsf. Aberration with fore-wings with dissimilar markings. Right wing has additional spot below cell.

8. *Nacaduba nora*, Feld. " Aberration in which the basal strigae are not produced below the cell. It grades perfectly into normal, through other specimens in my collection " (Ormiston).

9. *Chilades laius*, Cram. Aberration taken during extreme dry season.

10. *Arhopala*, sp. ♂ ♀ of an apparently undescribed species.

11. *Aphnaeus nubilus*, Moore. This would appear to be a good species. It is quite constantly different from the *Aphnaeus* known in Ceylon as *A. ictis*, Hew.

12. *A. ictis*, Hew. From Ceylon for comparison.

13. *A. ictis*, Hew. ♀ ♀. Aberrations in which the subapical orange spot is absent or nearly so.

14. *Aphnaeus*, sp. These as far as can be judged are the Race 2 of Ormiston ("Notes on Ceylon Butterflies," *Spolia Zeylanica*, 1918). They are also considered by Mr. Fairlie, who first met with the form, to be a distinct species. They would appear to differ fairly constantly, but the two poor specimens here shown are the only ones so far seen. They have been brought up so as to make the exhibit of this rather puzzling group as complete as possible.

Most of these specimens have been referred to by Ormiston already (*l.c.*), and have been presented by him to the B.M.

HORNED BEETLES.—Mr. G. J. ARROW showed a series of lantern slides to illustrate different types of armature occurring in Lamellicorn Beetles, and made the following remarks :—

Various theories have been put forward to account for these armatures. Darwin ("Descent of Man") believed they could be best explained by Sexual Selection, *i. e.* by the exercise of a preference on the part of the females for males with the best-developed horns. This theoretical preference was supported by no evidence of its actual existence in insects, and it is doubtful if any entomologist could be found to profess belief in its existence to-day.

Sexual Selection was rejected by A. R. Wallace, who suggested ("Tropical Nature," 1878) that horns in beetles might be explained as a means for making the bearers less easily swallowed by certain birds—the males being more active than the females, would be more liable to such risks, and therefore in greater need of such protection. But, whilst some horned beetles are very tiny and their horns extremely delicate, others are so huge that their size is sufficient to prevent any bird swallowing them whole, and moreover many of the males of these giant forms show by much more conspicuous coloration, etc., than that of the females that it is the latter, and not the males, to which special protection is accorded.

Reichenau (Kosmos, 1881) put forward the theory that the supposed rudimentary horns of the females were the really important structures, serving as implements for excavation, and that, whilst of no use in the other sex, they had been inherited from the female and had developed to an exaggerated extent.

Lameere (Bull. Acad. Belg., 1904) believes that horns were formerly possessed by all Lamellicorns, even Stagbeetles, Cockchafers, etc., but that they have in many cases been replaced by other forms of sexual dimorphism. He considers their special development in the males to be a form of compensation for the reproductive energy expended by the females.

These various theories are all attempts to explain the more

conspicuous and familiar types of armature, but none of them adequately account for the very diverse forms actually existing, sometimes in one sex only, sometimes in identical or in different forms in both sexes.

Fabre ("Souvenirs Entomologiques") has described the wonderfully elaborate nidification, in which male and female collaborate, of *Copris hispanus* and *C. lunaris* and *Geotrupes typhaeus*, and has observed the employment of the horns by the last. Probably if we knew the habits of other species we should find the armature serving a variety of purposes. In the absence of such information I have found useful evidence in the presence or absence of wear in the digging teeth of the front tibiae of male and female respectively. When the two sexes co-operate the average amount of wear is the same in both; in others the examination of a considerable number of specimens shows the wear confined to the females, and in one interesting case, *Corynoscelis glaucus*, Perty, a Dynastid curiously resembling the very remote *Geotrupes typhaeus*, it is markedly greater in the male. In many of the giant forms there is a great elongation, and consequently reduced muscularity, of the legs of the males.

Such evidence seems to me to indicate that in the very numerous species in which there is an armature in both sexes, or in which that of the male is not extravagantly developed, there is collaboration between the sexes, but that when the male is fantastically horned it is invariably a drone, bearing no part in nidification. In the former case the development is restrained by the operation of Natural Selection, which in the latter, while suppressing awkward outgrowths in the female, has had no such effect upon the comparatively unimportant male. It is perhaps not impossible that the conspicuousness of the male of the horned giants, frequently also manifested in these cases in a more brilliant exterior, may by attracting enemies to itself help to save the more important female and so become beneficial to the race.

Fabre's discovery of the existence of a prothoracic protuberance in the pupae of both sexes in the genus *Onthophagus*, although he was entirely wrong in declaring it to have no counterpart in adult beetles, appears to me to have great

significance as indicating the ancestral occurrence of a thoracic horn in both sexes. In what is probably the most ancient group of that immense genus (*O. tarandus*, F., and allied species) male and female have an identical armature.

I believe an armature to have been primitively common to Lamellicornia of both sexes; that it probably had some relation to the insects' habits, which there is reason to suppose were elaborate in the ancestral forms; that there has been a general tendency for the females to lose the armature, perhaps in correspondence with a division of labour between the sexes; and that the armature has developed fantastically in males which have ceased to collaborate with the females, and as a consequence of their diminished importance to the preservation of the species.

NEW OR RARE RHOPALOCERA COLLECTED IN CENTRAL CERAM BY MESSRS. F. C. AND J. PRATT, AT ELEVATIONS FROM 2500 TO 6000 FEET, IN OCTOBER AND NOVEMBER 1919. —Mr. G. TALBOT exhibited the following species on behalf of Mr. J. J. JOICEY:—

Troides procus Roths. (1914), ♂ and ♀. The ♂ is a new discovery, and indicates that *procus*, although allied to the *goliath* group from New Guinea, is a distinct species, and was so considered by Rothschild. The cell of the hind-wing is differently shaped. This species may rank with *alexandrae* as the largest *Troides* at present known. Only taken at 2500 ft.

T. supremus Rob. ♂ ♀ shown for comparison.

Papilio weiskei stresemanni Roths. (1915), ♂ and ♀. The ♀ was not obtained by Rothschild's collector. Taken at 6000 ft.

Delias sp. nov., ♂ ♀. The only species known in which the ♀ bears a red band on the fore-wing above. This species is allied on the one hand to *dohertyi* Roths. from Jobi and Biak Islands, and on the other to *negrina* Fbr. from Queensland. Taken at 6000 ft.

Delias stresemanni Roths. (1915), ♂ ♀. The ♀ ♀ show variation on the underside.

Delias echnida Hew., ♂ ♀. This very rare species has apparently not been recorded since taken by Dr. A. R. Wallace. The ♀ is undescribed, and a specimen exists in

the Joicey Collection taken by J. C. Kershaw in 1909, with locality "Amboina." Taken at 3000 ft. to 6000 ft.

Delias daris Hew., ♂ ♀. Always very rare. Taken at 6000 ft.

Euploea dentiplaga Roths. (1915), ♂ ♀. Taken at 2500 to 6000 ft.

Ideopsis klassika Mart. (= *stresemanni* Roths. 1915), ♂ ♀. Taken at 6000 ft.

Limenitis staudingeri Ribbe, ♂. This very rare and distinct species does not appear to have been recorded since Ribbe made his Ceram Collection. Taken at 3000 ft.

Eriboea subsp. nov. near *jupiter* Butl. A series was taken at 6000 ft. It is of great interest to note that no specimens of *pyrrhus* were sent. It is evident that two species at least are mixed with the *pyrrhus* forms, and quite possibly a third. The form shown is very close to *jupiter*, which we already know from New Guinea, the neighbouring islands and Aru. In *jupiter* Butl. we may have a distinct species. The so-called races of *pyrrhus* now require revision, as one species will be represented by *sempronius* Fbr., which is nearer to *jupiter* than to *pyrrhus*.

NOTES MADE BY THE COLLECTORS.

Locality.—Central Ceram (within four days of Tehoro on the South coast and five days of Waihai on the North coast). From Tehoro, the place where our camp is placed is visible as a cutting in the mountains. This is due to the extensive felling of the jungle which we carried out. The camp is just where the pass is, in the lowest part of the mountains, and the mean altitude obtained from three aneroids is 6150 ft. The nearest water obtainable on either side is 3000 ft. below. The source of a mountain stream is said to be in a spot at about 5000 ft., but it is quite impossible to make a path to it on account of the precipitous nature of the country. In parts there are sheer drops of 1000 ft. and more. A coconut which slipped over was not seen nor heard again. All, of course, is covered in primeval jungle. Rhododendrons are found commonly growing among the trees. There are few animals, and birds are not conspicuously present. The country

is too inaccessible even for deer, which abound in the lower altitudes where the formation is not limestone.

Climate.—The rainfall is heavy, but not nearly so heavy as in New Guinea, though there is great humidity. The temperature was never noticed above 72° or below 58° Fahr. In New Guinea at the same altitude we have had it down to 49° Fahr. A lot depends on the wind. The North-West Monsoon has now set in. This season, though rainy, is perhaps the warmer season in the mountains, but it would be necessary to stay a full year to obtain reliable results on this question. We do not think that in New Guinea and Ceram there is any marked butterfly season, though some things are unquestionably rarer during some months than during others. It will be clear, however, that it would require permanent residence in one place to decide this point, as nearly all things are to a certain extent local, and may be common on one side of a bay and rare on another. It is the same in the mountains, certain ridges having their common and rare species. We have noticed no difference in species on the various sides of the mountains as is so marked in S. America.

From May till September the South-East Monsoon blows, and this is the "dry" season. That is to say, there is less rain than during the North-West, which blows from October till April.

Habits of Delias.—Around about our camp we have felled the jungle in large areas, and men are placed in the trees on the edges of the clearings. Generally speaking the *Delias* males are only found in this way, and this will explain the apparent comparative rarity of this sex in some species. The females are generally taken either in sunny spots in the jungle or flying over the ridges within reach. When the males come over that way they are nearly always out of reach. One magnificent species, undoubtedly new, does not seem to go below 5000 ft. Curiously enough most of the females of this species were taken at 6000 ft., and most of the males at 5000 ft. We think it is a high species. On the wing the female is remarkably like the South American *pereute*. This is due to the black upper surface with a beautiful red or orange band

on the upper surface of the fore-wing. The one we think may be *stresemanni* (with the diverse ♀ forms) is like its ally *D. rothschildi* in New Guinea, found as low as 3000 ft. In comparison with New Guinea it is extraordinary that we have so far only found two species confined to the higher altitudes (perhaps *echidna* is not found at the coast, but it is no great rarity at 3000 ft.). We think there must be more species; in fact, we have seen one which seems to belong to the *pratti* and *castaneus* group, but it is larger. Therefore we hope to make a camp near the top of Mount Moerkele, which is the highest mountain in Ceram. It is between 8000 and 9000 ft. The top is nothing but stone and rock.

Thus in summing up:—

Delias dorumene, *duris*, *caeneus* and *isse* are found at the coast and in the mountains at 6000 ft.

The two new ones are found above 5000 ft.

D. stresemanni above 3000 ft.

With regard to *Ornithoptera proeus*, the insect seems to be very rare, but is most easily obtained in the open country at the foot of Mount Moerkele at 2500 ft. It is obviously not a coast insect, but is a fairly low form corresponding to the true *goliath*, *titan*, *supremus* and *samson* forms in New Guinea. This is not the case with *joiergi*, which is apparently only found in the steaming valleys surrounding the higher ranges, and we think it doubtful if it descends below 4000 ft. The limit of *O. rothschildi* is probably more 5000 or even 6000 ft. perhaps. With *proeus* it is interesting to note that the male bears a delicate perfume which is hard to define. It is not like any particular flower, yet is distinctly pleasant to the human sense. Perhaps the best way to describe it is as the scent emanating from a hot-house of living plants. This characteristic is perhaps not peculiar to *proeus*, but we have never noticed it before in any others. Perhaps it has been overlooked, as the scent is only perceptible on placing the wings to the nostrils. There is no smell noticeable in *primus* and *helena*.

EVIDENCE THAT THE VIOLA, BUTL., ♀ F. MIM. OF CHARANES
ETHROCLUS, CH., FLIES WITH ITS MODEL C. EPJASUS, REICHE.--
Prof. POULTON said that at the meeting of last December

he had shown a lantern slide representing these two species captured in the same locality and within a few days of each other. After the meeting he had sent a print of the negative to Lt.-Col. R. S. Wilson, Governor of the Western Desert Province of Egypt, and had asked him if he remembered whether the two butterflies flew together in the Nuba Mountains Province. Col. Wilson replied as follows :—

“ Mersa Matruh, Egypt.

“ 7.ii.1920.

“ Many thanks for your letter of 11.xii.1919 and for the photos of the *Charaxes* enclosed therein. Yes, the *viola* ♀ form of *etheocles* flies with the *epijasius*, and is almost indistinguishable from it on the wing except for its smaller size. I was out with Capt. Kent Lenon at Talodi when I took my first specimen of the former butterfly, and we both thought it was an *epijasius* until it was netted. Afterwards it was possible to distinguish it with care when on the wing, owing to the difference in size. We both took several *epijasius* round the same tree that day, and later, on several occasions, took them together. The tree particularly favoured was called Arrada (plur. Arrad) locally, viz. *Albizia amara*, Boirin. The ‘ Catalogue of Sudan Flowering Plants,’ by A. F. Brown, describes it as a large tree with strong timber. It is thornless, loses its leaves in the dry season, and flowers March to May. Its flowers are like those of *Mimosa*, but white instead of yellow. It seeds very freely, and the seed-pods are flat and broad. It belongs to the Mimosa group of the *Leguminosae*. All the *Charaxes* I took in the Nuba Mountains Prov. are partial to it, viz. *varanes*, *epijasius*, and *etheocles*. *C. varanes* when hanging downwards from a twig with closed wings is extraordinarily like a partially broken and dry seed-pod (which is then reddish brown) both in colour and pattern, the small circular markings on the underside of the butterfly looking like the seeds which show through the constricted parts of the pods where they lie.”

THE ATTACKS OF BIRDS ON BUTTERFLIES WITNESSED IN NYASALAND BY W. A. LAMBORN. THE MARKS OF A BIRD'S BEAK RECOGNISABLE ON REJECTED WINGS.—Prof. POULTON

exhibited and illustrated by a lantern slide the examples enclosed in the following letter from Mr. W. A. Lamborn. The method of transport had not caused any deterioration, and the marks of the bird's beak at the base of the wings were quite clear. The other material described in the letter had not as yet been received, but it was thought better to make the letter public without delay in order that the new method of investigation might be known and pursued as soon as possible.

"Karanga, Nyasaland.

"10th December, 1919.

"... As a result of two thunderstorms the buds are bursting, and with the appearance of flowers butterflies have become more numerous, especially *Catopsilia florella*, which must, I feel sure, have come by migration, for they have not been breeding hereabouts, the food-plant having been leafless till recently, and there have been none about. Being interested in the question of their sex colour in various localities I have kept a special look-out for them. Just outside my verandah is a *Poinciana regia* (Flamboyant Tree), about 20 ft. in height, just now forming a crimson blaze of open flowers though the leaves are still very small; and this is attracting a host of insects—various Sphingids, especially *Nephela*, at dusk, Chafers and other beetles when it is dark, Hymenoptera, especially Vespids, in the early morning, and when the sun is high *Catopsilia* in considerable numbers, this being the only species of butterfly at all abundant as yet. Underneath the tree I have found frequently, during the last few days, the wings of the butterfly, and the question as to what has been the destructive agent has engaged my attention. Lizards are out of the question: I have studied the tree thoroughly and there are none; neither have I seen here except very rarely any of a size sufficient to be able to tackle a butterfly. The wings collected also do not any of them exhibit the kind of damage one associates with lizards—the base chewed off, much of the wing denuded of scales, crumpled and showing numerous tooth punctures. Birds being the only possible agents, and the early morning when they are still hungry being the most likely time to make any observations,

I concealed myself yesterday, 10th, [?9th] at 9 a.m. among some *Hibiscus* shrubs and watched various birds on the tree. At the end of about half an hour a small yellow bird with black head arrived, perched in a clump of flowers and swooped out at the first *Catopsilia* which came near, returning with the butterfly in its beak to its perch, where, having pulled off the wings one by one, it ate the body and then flew away. Another bird of the same species arrived soon after and also sat among the flowers, from which it swooped out on the first *Catopsilia* arriving to feed close at hand, catching it, tearing off the wings while on its perch and eating the body; and by and by I saw it take and eat a second insect. I am not quite sure how the *Catopsilia* was held, but think it was pressed down beneath one foot on the branch while the bird pulled off the wings. In each instance the body was pulled into three separate bits and so eaten. I obtained some of the wings of the butterfly eaten by the first bird, and some from those taken by the second, and the appearances they present are similar to those seen on many of the wings picked up—linear markings across the wing base without any great denudation of the scales generally.

"I followed the movements of the second bird as far as possible till mid-day, only losing sight of it once or twice for a few seconds, and it then flew down on to the grass and seized and took up into a tree an Orthopteron, which it proceeded to dismember and to eat. I then shot it and examined microscopically the contents of the alimentary canal, for the material other than the head of the Orthopteron was pulped and unrecognisable by the unaided eye. I studied first the rectal contents, and to my joy at once found scales: on comparing these with some scrapings from the wing of a *Catopsilia* I found many identical. The stomach contents of course exhibited them in great abundance. An important point I think is that though the bird had been seen to eat two butterflies barely two hours previously, I could recognise no portions of them except with the aid of the microscope. This rapidity of digestion may explain how it is that butterflies' bodies are so rarely found in the stomach contents of birds.

The poor bird, very badly skinned I am afraid, is labelled

(279), and I have preserved the stomach contents (279a) and contents of intestine (279b) in about 40% spirit.

"In the course of the afternoon I saw another bird about the same size but of another species dashing out in unsuccessful pursuit of a *Catopsilia*, and a third bird, which as before swooped out from a clump of flowers after another of the butterflies, but without any luck.

"11th December.-I saw this morning a third species of bird, rather larger than the other two so far seen butterfly catching--a black one with forked tail and a bright crimson iris--dart out and catch a *Catopsilia*, which it ate all except one wing which I could not find.

"I have devoted some time to-day to a more critical study of the *Catopsilia* wings picked up under the trees near the house, and have discovered a most interesting point--that many actually exhibit a V-shaped mark (due to denudation of the scales) towards the costal base, often directly across the nervures and sometimes rather obliquely, the marks corresponding on both sides of the wing. This is unquestionably and I am sure you must agree, the mark of a bird's bill, and in one or two cases the marks are particularly instructive, because one can see that the bird's first attempt to pull off the wing was unsuccessful, the bill having slipped, and that then a second attempt which must have been more successful was made. I have labelled many of the specimens which show this mark particularly well, in the series (303, 304, 305, 306), and I invite your attention especially to a headless butterfly in series (303) which shows, across the base of one hind-wing, a beautifully sharply defined impress of a bird's beak.

"In cases in which there are linear markings only across the wing it must almost necessarily be conceded that these have been produced by birds, if for no other reason than that the marks are paralleled in the wings which I actually saw torn off by the bird. I shall await with considerable interest your examination of the Zomba series of wings, comprising far more varied butterflies, though, even if these marks are not shown, it by no means follows that they were not killed by birds, for the markings may have become

obliterated in the course of the vicissitudes the wings were subjected to during an indefinite period before I came along to pick them up—further damage by other insects, scraping as they were blown about by the wind or pelted by rain.

“13th December.—I have once again seen my yellow bird with black head attack a *Catopsilia*, swooping out a short distance from its lurking-place among a mass of *Poinciana* flowers on the advancing butterfly, a mode of attack under easy circumstances which, as I see in the Proc. Ent. Soc., Pt. I, 1915, p. xxxvi, in Swynnerton's paper, had long before been suggested as probable by Dr. Marshall.

“My examination a day or two ago of the contents of the alimentary canal of the bird and my further perusal of Swynnerton's paper, or rather reply to Colonel Manders, has induced me to undertake the examination of a series of birds' droppings collected under my *Poinciana* and other trees likely to attract butterflies. The results have been to me rather surprising. Up to date I have examined under a low-power objective thirty pellets, seventeen of which contain the scales of Lepidoptera, I believe *Catopsilia*. But my own knowledge of insect histology is very limited, and I feel that it would be better for some one having a wider experience—perhaps Dr. Eltringham—to express an opinion on them, and so I have put aside all pellets in which I have found the scales (308), and if he is able to spare the time I am sure it will afford him no little recreation to put his knowledge of the histology of the fragments to the test by identifying the disjuncta membra of a whole host of insects besides the butterflies, much as when I was a medical student it used to be a question of pride in the work to be able to recognise all sorts of odd bits of shafts, tubercles and epiphyses of bones. I will examine if possible exactly one hundred pellets of excreta.

“A week or two ago I felt sure I saw a wagtail offering to a young one soliciting food the body of a *Catopsilia* with part of one wing attached; yet I thought I might be mistaken, because I have rarely seen the birds catching food above-ground, though when in 1914 I fired the grass in tsetse country, hoping to see if any birds took toll of the flies driven before the flames, I remember the same sort of wagtails taking

many Orthoptera high in the air. It seems, too, to be the general opinion that these birds feed habitually on smaller insects. However, it occurred to me to examine the excreta which these birds often drop on my verandah, for there is a family of them with which I am on friendly terms, and when I am alone in the house they always come and very often enter. These pellets do contain the scales of Lepidoptera, I believe Pierine, and so I will pack these separately and obtain some, as to the source of which there will be no possibility of doubt, by watching the birds.

"14th December.—I saw to-day a black-headed yellow bird take a *Catopsilia* and dismember it in the usual way, but I only obtained a bit of wing, which shows well the beak mark. It has just occurred to me that I can send you in this letter a few wing fragments bearing this mark, and a specimen of excreta.

"In considering the question of bats as destroying insects it has occurred to me that I might examine their excreta too, so I entered a room in the house shut nearly all the time I have been here and infested by the animals. Here the floor is covered with their excreta, which I examined, finding numerous scales of Lepidoptera, doubtless moths, a number of which, for some reason or other, they must have brought in, for there are on the floor many wing fragments, which I am collecting, labelling both excreta and wings.

"With further reference to the question of birds taking *Catopsilia*, there is no dearth of other insects here, Orthoptera now swarming. I saw an old man last night collecting them—Locustids—which he assured me he was going to boil and eat."

OBSERVATIONS ON THE ENEMIES OF THE LARVAE OF THE PIERINE BUTTERFLY *CATOPSILIA FLORELLA* IN EAST AFRICA.—Prof. POULTON said that he had also received the following interesting notes by Mr. Lamborn :—

"Karungu.

"12th December, 1919.

"I have been often going to give you a little account based on some notes made a year ago at Lindi, of the larvae of *C. florella* and their enemies. I now append it :—

" In an account of the ways of the fly *Bengalia* reference was made as to the escape, by making convulsive wriggles, of these larvae from the fly bent on seizing them and sucking their juices. The further value of the action on the part of the larvae was shown in the course of a study of the habits of the wasp *Eumenes maculosa*, de G., which in E. Africa stores its nest with the larvae, a prey different from that stored by the species in S. Nigeria, which there collects Noctuid larvae.

" At Lindi in December 1918 the Eumenids were so abundant that many opportunities were afforded of watching them, and there was an absolute plague of the Pierine larvae. A Eumenid flies round and round the bush, a leguminous plant, on which the larvae feed, examining the larvae in turn, especially the larger ones. Unless almost at maturity the larva shows no appreciation of the presence of its enemy, nor does the wasp molest it; for it preys only on those fully grown. But when the wasp approaches a mature larva, it usually shows instant alarm, evading its would-be captor by immediately dropping unsupported by silk, and, should it fall on a leaf, wriggling violently, so as at once to reach the ground. In this way it usually escapes, especially if it has fallen from a height; for the wasp usually gives up the quest at once, though in a few cases in which the attack was made on a larva near the ground, the wasp was seen to settle and to wander in search of it in a perfunctory way. In no single instance, however, was a larva seen to be taken when once it had fallen.

" When, owing to lack of promptitude in dropping, a larva is seized by the Eumenid, the first act of the captor -gripping it behind the head and often pinning it to the midrib of the leaf on which during the warmer hours the larva rests -is to sting it ventrally in the centre of each of the first three segments. The larva forthwith becomes motionless, and the wasp then endeavours to lift it. This it is frequently at first unable to do, for, probably owing to tonic muscular spasm induced by the injected poison, the abdominal feet still firmly grip the leaf, in which case the wasp, supporting the larva with its legs, proceeds with its mandibles to disengage in

turn each pair of feet. It then invariably flies off with its prey for a few yards and usually to a higher elevation. Here it makes its toilet, rubbing its legs together and cleaning them between its mandibles, and it then proceeds to sting its victim again in the ventral surface of each segment, usually from before backwards, commencing at the 4th and sometimes in regular order, though this is not invariable. The wasp then flies high with its prey and is gone.

"In the vicinity of Domira Bay, Lake Nyasa, the predaceous enemies commonly attacking these larvae seemed to be ants, especially Camponotids, which made organised hunts for them. In such cases the larvae invariably made their bid for safety by means different from those employed against the attack of the Eumenid, letting themselves down by a thread and remaining suspended in mid-air until the danger had passed. In this case it seemed to be the younger larvae rather than the older ones which were sought by the ants."

Papers.

The following papers were read :

"Butterflies of Cyprus," by H. J. TURNER, F.E.S.

"An undescribed Lycaenid from Cyprus, *Glaucopsyche paphos*, n. sp.," by T. A. CHAPMAN, M.D., F.R.S., etc.

Wednesday, March 17th, 1920.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

Election of Fellows.

Messrs. CHRISTOPHER ARTHURTON CHEETHAM, Wheatfield, Old Farnley, Leeds; G. S. COTTERELL, Newlyn, Gerrard's Cross; HARRY LEON GAUNTLETT, F.Z.S., M.R.C.S., L.R.C.P., A.K.C., 45, Hotham Road, Putney, S.W. 15; THOMAS FREDERIC MARRINER, 2, Brunswick St., Carlisle; C. SMEE, 6, Wildwood Road, Golders Green, N.W. 4; and Dr. B. UVAROFF, the Georgian Museum, Tiflis, Transcaucasia, were elected Fellows of the Society.

Proposed Alteration of Bye-Laws.

The proposed alterations in the Bye-laws were read for the second time.

Exhibitions.

VARIETIES OF BRITISH LEPIDOPTERA.—Prof. POULTON exhibited on behalf of Mr. F. C. WOODFORDE the following varieties from the collection of British insects in the Hope Department at Oxford.

1. *Chrysophanus phlaeus*, L., ab. *schmidtii*, Gerh., Burnt Woods, Market Drayton, N. Staffs.: Sept. 8, 1917. F. C. Woodforde.

2. A variety of the same species with the coppery area of the fore-wing replaced by a smoky ochreous. The same locality: Aug. 5, 1918. H. F. Onions.

3. The var. *eleus*, F., of the same species, Milford, Surrey: July 29, 1908. From the collection of the late Lt. R. J. Champion.

4. *Cyaniris argiolus*, L., var. with radiate spots on the hind-wing underside, the fore-wing spotless. Near Ashurst Lodge, New Forest: May 8, 1915. F. C. W.

This variety approaches the ab. *sabtus-radiata*, Oberth., taken at Rennes and figured by M. Charles Oberthür (*Études d'Entomologie*, XX, Pl. iii, fig. 24). The figure, however, shows on the fore-wing under surface the existence of large spots of which the one next the costa is considerably elongated. The spots on the hind-wing are exactly similar to those of the exhibited specimen. M. Oberthür remarks: "C'est l'échantillon le plus caractérisé que nous connaissons pour le développement de ses points noirs en dessous."

5. *Catocala nupta*, L., var. with the red of the hind-wings replaced by a dark maroon colour. Taken at light, Guildford: Sept. 2, 1907. From Coll. R. J. Champion.

THE STRATIOMYID FLY *BERIS VALLATA* CAPTURED WITH ITS TENTHREDINID MODELS.—Prof. POULTON exhibited a series of 6 examples of *Beris vallata*, Forst., captured with the following *Tenthredinidae*—2 ♀ *Dolerus aericeps*, Th., 1 ♂ *Selandria serua*, F., 4 ♂ *Athalia lineolata*, Lep., by Mr. A. H. Hamn, on July 13, 1907. All 13 insects were taken from flowers,

chiefly Umbelliferae, growing over a small area of Hogley Bog, Cowley, near Oxford. The first-named sawfly was far less perfect as a model than the other two, the last-named being the most perfect.

ENTOMOLOGICAL-METEOROLOGICAL RECORDS.—MAJOR H. C. GUNTON exhibited a diagram referring to Macrolepidoptera of the 1919 season in order to suggest a graphical method of recording observations of the appearance and habits of insects in relation to weather conditions.

On a sheet of squared tracing cloth (each square having sides one-tenth of an inch) the names of the species of insects are tabulated vertically on the left-hand side in the order in which they appeared on the wing, while along the top and bottom the dates are written, so that there is one horizontal row of squares for each species and one vertical row for each date. By means of different symbols representing *sallow*, *sugar*, *ivy*, *light*, "*settled*" and "*in flight*," the circumstances in which each observation is made are recorded in the appropriate square.

The lower portion of the same sheet is devoted to particulars of the weather for each day, plotted to convenient scales and including rainfall, humidity, barometer, maximum and minimum temperature, direction and strength of wind, and general character of weather, using the same conventions as those employed by the Meteorological Office. The quarters of the moon are also indicated.

It is claimed that systematic records plotted in this manner have the following advantages:—

(1) The species on the wing throughout the year, the order of appearance and the rate at which they successively appear, the length of existence in the perfect state, and the occurrence of two or more broods in certain cases can be seen at a glance.

(2) The simultaneous appearance on the wing of different species of butterfly occurring at the same time in any locality is largely a matter of a reasonably warm day and sunshine, but in the cases of the moths there is a much more subtle combination of conditions which occasionally produces extraordinary results. The diagram facilitates the study of these conditions; for example, it recorded in the most compact

manner that on the 6th April the greatest number of species were observed at sawlow, the minimum temperature being 45° F., or 6° F. above the mean, the weather overcast and quiet, the humidity 70 per cent., and the moon, in the first quarter, setting early.

(3) The comparison of diagrams corresponding to different years should also facilitate the study of the effect of weather on the appearance of species, having regard to their occurrence during the winter in the egg, larva, pupa or perfect state.

(4) Apart from the effect of the weather on time of appearance, there is room for further investigation as to its effects, direct and indirect, on the abundance or scarcity of a species. When one considers the very great differences between the simultaneous states of different species, that, as regards weather, one insect's meat is another's poison, and that any one species may have encountered favourable conditions during one stage but unfavourable during another, it seems clear that the subject is so complex that it can only be analysed and the results expounded by the comparison of systematic records.

(5) Another interesting line of investigation suggested by such diagrams is the effect which a sudden setting in of unfavourable weather, in the middle of the period of emergence, will have on the propagation of a species, having regard to the fact that the males usually emerge a few days before the females.

(6) There are still some problems to be solved bearing on immigration. Here, again, simultaneous records in different localities might throw further light on this subject by indicating the weather conditions, the points of arrival, and the general directions in which the immigrants spread themselves over the country.

A copy of the Diagram can be seen at the Society's Library.

BIRDS AND BUTTERFLIES.—Dr. G. D. H. CARPENTER said that since many naturalists believe that birds do not eat butterflies no case of such an occurrence should be left unrecorded; on Feb. 15th of this year about mid-day he saw a male Brimstone Butterfly fly through the garden at Oxford.

and three sparrows that were on the ground leapt into the air and, fluttering clumsily, attempted to catch it; the butterfly easily evaded the birds.

LIFE-HISTORIES OF SOME COLEOPTERA.—Mr. H. MAIN exhibited Lantern Slides illustrating the life-history of the Beetles *Copris lunaris*, *Orthophagus ravena*, and *Necrophorus humator*.

Papers.

The following papers were read :—

"A contribution to our knowledge of the Life-history of the Stick Insect, *Carausius morosus*, Br.," by GEORGE TALBOT, F.E.S.

"A Record of Insect Migration in Tropical America," by C. B. WILLIAMS, M.A., F.E.S.

"The Geographical Factor in Mimicry," by F. A. DIXEY, M.A., M.D., F.R.S., etc.

Wednesday, April 7th, 1920.

Mr. W. G. SHELLON, F.Z.S., Vice-President, in the Chair.

Death of a Fellow.

The death was announced of the Rev. STEPHEN HENRY GORHAM, the oldest Fellow of the Society, who joined it as far back as 1855.

Election of Fellows.

Mr. G. F. C. BEESON, Indian Forest Service, Forest Recorder Institute, Dehra Dun, U.P., India; Capt. BUSHELL, Imperial Bureau of Entomology, Natural History Museum, S. Kensington, S.W. 7; Major H. C. GUNTON, M.B.E., Hobart, Gerrard's Cross, Bucks; Messrs. OWEN HUTCH-WALTERS, M.A., Knoll Cottage, Ufford, Woodbridge, Suffolk; PERCY J. LATHY, Curator to Mme. Horrack-Fournier, 50, Boulevard Malesherbes, and 70, Boulevard August-Blanqui, Paris; and Prof. BENEDITO RAYMUNDO, Director of the Museum of the Agricultural Society of Rio di Janeiro, 76, rua Senador Alencar, Rio di Janeiro, Brazil, were elected Fellows of the Society.

Exhibitions.

RARE BRITISH BEETLE.—Mr. BEDWELL exhibited a specimen of the beetle *Otiorrhynchus ligustici*, L., taken near Ventnor, one of the rarest of the British weevils, of which there has been no recent record.

FLUORESCENCE IN LEPIDOPTERA.—Drs. J. C. MOTTRAM, F.Z.S., and E. A. COCKAYNE, D.M., F.R.C.P., gave a demonstration of fluorescence in Lepidoptera by ultra-violet radiation, of which they have submitted the following account. The demonstration has only recently become possible as a result of an invention of Prof. Wood of Baltimore University. Prof. Wood has produced a glass which, whilst allowing ultra-violet radiation to pass, is opaque to light. It is transparent to radiation of wave-lengths lying between 3900 and 3100 Å.V. It also allows a narrow band of red light to pass; this can, however, be avoided by using a quartz mercury vapour lamp, which is deficient in this light. Used in this way a beam of invisible ultra-violet radiation is obtained. A similar glass is now being made in this country by Messrs. Chance Bros.

This radiation is especially useful for the examination of objects for fluorescence, so much so that a great many objects not hitherto known to be fluorescent were found to be so. It would seem to be a delicate test because a great contrast is produced between non-fluorescent objects, which appear black no matter what their local coloration, and fluorescent objects which glow more or less brightly.

In view of the interest which physicists have taken in the brilliant coloration of many birds and insects in an endeavour to explain them on a physical basis,* it occurred to us that an examination in ultra-violet radiation would go far to decide whether or no fluorescence played any part in these brilliant colours. The first insects examined were various *Lycaenidae* and other iridescent species, chiefly on account of the paper by Sims,† suggesting that their colour is due to a fluorescent pigment.

We chose a number of representative British and Tropical *Lycaenidae*, including *Agriades coridon* and *A. thetis*, and a *Morpho*, as examples of iridescent blues. Purples and

* Lord Rayleigh, *Philos. Mag.*, 6th Series, No. 217.

† H. M. Sims, *Canadian Entomologist*, 1915, p. 161.

purplish blues were represented by *Apatura ilia*, *Terivos poros*, *Isamia superba*, *Elymnias casiphona* and the Castniid moth *Cyclosia ampliatus*, copper by *Chrysophanus rutilus*, *Rumicra phloeas* and a male *Zegris chrysomallus*, and blue-green and green by *Papilio blumei*, *P. milov*, *P. philevor*, *Zygæna filipendulae*, *Ino statice* and others. We also examined some Pyrales, which showed a mother-of-pearl iridescence, the pearly underside of *Agraulis rencia*, and the metallic *Plusia festucae*, *P. chrysis*, *P. moueta* and *Spatulia plusioides*. None of these showed any fluorescence. Later on we examined most of the British moths and a large number of Tropical butterflies and moths belonging to widely different groups, but only a very small proportion proved to be fluorescent. The glistening yellow hind-wings of *Troides* (*Orvithoptera*) *helenæ* and *T. darsius*, Gray, were very fluorescent, as were the yellow markings of *T. haliphron* and *T. hypolitus*. The duller yellow of the females was less fluorescent than that of the males. The yellow on the abdomen of the males of *T. alexandriae*, *T. poseidon*, *T. urvilleana*, Guér., and *T. croesus*, Wall., and the thin yellow areas on the hind-wings of the last-named species were fluorescent, but the other brightly coloured portions were non-fluorescent.

The following is a list of other fluorescent species.

Geometridae.—*Opisthographis lateolata*, Dup., *O. tridentifera*, Moore, *Scoria lineata*, Scop. (*dealbata*, L.), *Aspilates gilvaria*, F., *Venilia himalayica*, Koll., *Corpnicea specularia*, Moore (very slight fluorescence), *Euctenurapteryx maculicandaria*, Motsch., *Ourapteryx sambucaria*, L., *O. oblectata*, Guen., *O. pluristrigata*, Warr., *O. clara*, Butl., *O. persica*, Mén., *O. nireæ*, Butl., *O. sciticaudaria*, Walk., *O. picticaudaria*, Walk., *O. primularis*, Butl., *Enurapteryx nigrociliaria*, Leech, *Myrteta oceanaria*, Swnh., *Orthocabera sericea*, Butl., *Sirinopteryx rufivinctata*, Walk., *Vindusara metachromata*, Walk.

Uraniiidae.—*Urania rhipacus*, Drury (white fringes and tails fluorescent), *Epiplema himala*, Butler.

Hepialidae.—*Hepialus humuli*, L. (male).

Arctiidae.—*Hylophila bicolorana*, Fuesl. (white hind-wings), *Habias prasinana* (white hind-wings of female), *H. sylpha* (white hind-wings of female).

Lycenidae.—*Cyrtis acuta*, *Cyaniris argiolus*, L. (undersides slightly fluorescent).

The most brilliant are *Euctenura*, *Oura* and *Sirin*. The closely allied *Thinopteryx* does not fluoresce. *Aspilates strigillaria*, Hb., is non-fluorescent, though *A. gilvaria* is one of the brightest in ultra-violet radiation.

Abraxas, which is closely allied to *Vindusara* in structure and resembles it in colour and markings, shows no fluorescence, nor does the white Uraniid *Micronia aculeata*, Guen. It will be interesting to examine genera allied to those which we have found to be fluorescent. In the case of the *Geometridae* Mr. Prout has promised to help us. All the species, which we have discovered to be fluorescent so far are whitish or yellow, but whether it is due to the same pigment in the different groups we are unable to state.

By carefully denuding an area of wing of its scales on both the upper and under sides we found that the membrane is not fluorescent.

The scales of *T. helena* after most of the pigment has been dissolved out still show their strong longitudinal and less-marked transverse striae.

The table on p. xxxix shows the effect of a few chemical reagents, but it must be pointed out that acetic acid gives a colourless solution slightly fluorescent in ultra-violet radiation in the case of non-fluorescent species such as *Diaphora mendica* and *Abraxas ulmata*.

The discovery raises the question of whether the fluorescence is of any value to the insects. It is generally accepted that the male of *Hepialus humuli* is coloured white in order to attract the female during his hovering flight at dusk. The fact that the white is fluorescent probably aids the female, which is non-fluorescent, in her search. It is interesting that the white males from the Shetlands are much less fluorescent than English ones, those with red markings on a white ground only very slightly fluorescent, and those coloured like females are non-fluorescent. It is so light when the males fly in the Shetlands, that the white coloration and fluorescence are not of much use.

In the case of the *Geometres* both sexes are equally fluo-

cent. All are light-coloured and therefore conspicuous on the wing at dusk, and their fluorescence must add to their visibility.

The *Ornithoptera* fly high up in the full sunlight, but their pattern is obviously designed to attract notice, and the peculiarly bright and glistening appearance of the yellow part of their wings, which is unlike the yellow of any other butterflies, may be due to the fact that they are fluorescent.

	<i>Troides helena</i> .	<i>Troides danius</i> .	<i>Graphocephalus fahaka</i> .	<i>Graphocephalus umbellatus</i> .
Potassium hydrate 10%.	Readily soluble in cold. Dark orange solution fluorescent in ultra-violet radiation.		Readily soluble in cold. Dark orange solution fluorescent in ultra-violet radiation.	Readily soluble in cold. Dark orange solution fluorescent in ultra-violet radiation.
Glacial acetic acid.	Soluble with difficulty on heating. Pale yellow solution. Slight green fluorescence by daylight. Well-marked green fluorescence in ultra-violet radiation.	Readily soluble on heating. Bright yellow solution with green fluorescence in daylight. Well-marked green fluorescence in ultra-violet radiation.	Readily soluble in cold. Bright yellow solution with marked green fluorescence by daylight and in ultra-violet radiation.	Readily soluble in cold. Pale yellow solution. No fluorescence in daylight. Well-marked pale bluish fluorescence in ultra-violet radiation.
Ethyl and methyl alcohol.	Insoluble.		Slightly soluble. Pale yellow solution fluorescent in ultra-violet radiation.	Slightly soluble. Pale yellow solution fluorescent in ultra-violet radiation.
Chloroform, ether, xylol, petrol, benzene.	Insoluble.		Insoluble.	Insoluble.

If solution in glacial acetic acid is evaporated to dryness, water gives a deep yellow non-fluorescent solution, ethyl alcohol a pale yellow very fluorescent one in the case of *O. fahaka*.

Epping Forest.

The SECRETARY read a letter from the Essex Field Club protesting against a Parliamentary Bill for the permanent alienation of parts of Wanstead Flats and Epping Forest for allotments, and on his motion, seconded by Lord ROTHSCHILD, it was unanimously resolved to send a letter in similar terms to the Prime Minister, and others who might be interested in supporting the protest.

Wednesday, May 5th, 1920.

Special Meeting.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

The Requisition of the Special Meeting signed by the President and six other members of the Council, was read from the Chair.

Mr. BETHUNE-BAKER proposed that the suggested alterations in the Bye-laws be received—seconded by Lord ROTHSCHILD and carried. The suggested alterations were then put separately before the meeting from the Chair.

CHAP. II. *Constitution.*

The Society shall consist of Honorary and Ordinary Fellows.

Proposal.—After the word "Honorary" insert the words "Special Life."

Carried on the motion of Mr. BAGNALL, seconded by Mr. S. EDWARDS.

CHAP. III. *Management.*

. . . No Fellow shall be eligible as an ordinary Member of the Council until he shall have been a Fellow for three consecutive years, nor shall he serve for more than three years successively.

Proposal.—Seventh line, after the words "nor shall" insert in place of the word "he" "any Fellow, including Vice-Presidents and Co-opted Members."

This addition, which was in accordance with a standing order of the Council, was rendered necessary by the question being raised whether Vice-Presidents were "ordinary" members and whether the portion of a year served by a Co-opted Member should count in his three years. The proposal was carried on the motion of Mr. H. J. TURNER, seconded by the Rev. F. D. MORICE.

CHAP. X. *Librarian.*

2. The Council may employ a Sub-Librarian.

Proposal.—Section 2, First Line, after the word “Sub-Librarian” insert “or other Official.”

After the end of Section 2 add :

Section 3. The Sub-Librarian or other Official shall, under the authority of the Council, be responsible for the safe keeping of the property of the Society.

It was explained that on removal to other premises the work of the Resident Official would be by no means confined to the Library, and that the title Sub-Librarian would no longer be applicable. The first alteration was carried on the motion of Mr. H. J. TURNER, seconded by Dr. COCKAYNE, the second on that of Mr. DURRANT, seconded by Dr. CAMERON.

CHAP. XI. *Library Regulations.*

Proposal.—Before present Sections add a new Section :

Section 1. Any Fellow shall be allowed the loan of Books from the Library, under such regulations, and with such exceptions and restrictions, as the Council shall from time to time determine.

Carried after some discussion, on the motion of Mr. BETHUNE-BAKER, seconded by Lord ROTHSCHILD.

Proposal.—After Chap. XI. add new Chapter headed, *Election of Council*, transferring thereto Sections 3, 4, 5, 6, 7, 8, 9 and 10 of Present Chapter XX.

Carried without discussion on the motion of Mr. BETHUNE-BAKER, seconded by Mr. S. EDWARDS.

CHAP. XII. *Election of Fellows.*

4. Fellows shall sign the Obligation Book of the Society at the first Ordinary Meeting of the Society at which they are present, and shall then be admitted by the President.

Proposal.—Section 4. Delete the words “by the President” and add “in manner and form following ; The President

taking him by the hand shall say: A.B. in the name and by the authority of the Entomological Society of London, I hereby admit you a Fellow thereof."

Add two new Sections:

5. Every Fellow shall on election have immediate notice conveyed to him by the Secretary of his election, accompanied by a copy of the Charter and Bye-laws.

6. Every Fellow on election shall sign an obligation for the regular payment of his Annual Contribution, so long as he shall continue a Fellow, and if any Fellow shall not sign such obligation within six months after his election, the said election shall become void.

The addition to Section 4, which crystallises the invariable custom of the Society, was carried without comment on the motion of Mr. DURRANT, seconded by Mr. LLOYD.

The new Section 5 was also passed without comment on the motion of Mr. E. E. GREEN, seconded by Lieut. ASHBY.

Mr. P. A. BUXTON pointed out that a hardship might be inflicted in some cases by the new Section 6; there was for instance at present a newly elected Fellow in Tiflis without any means of postal communication, and Mr. KAYE proposed and Mr. BUXTON seconded an amendment to add the words "at the discretion of the Council." The TREASURER pointed out that this would involve a reference to the Council on each separate occasion, and Mr. TONGE suggested altering the last three words to "may be cancelled"; Lord ROTHSCHILD suggested adding the words "unless the Council shall otherwise decide," and Mr. KAYE then withdrew his amendment and seconded Lord ROTHSCHILD's which was carried. The new section as amended was carried on the motion of Mr. BETHUNE-BAKER, seconded by Dr. GAHAN.

CHAP. XIII. *Admission Fee and Annual Contribution.*

1. The Admission Fee shall be £2 2s., the Annual Contribution £1 1s.

2. Fellows permanently resident out of the United Kingdom shall pay the Annual Contribution, but shall be exempt from payment of any Admission Fee.

3. The composition for Life Fellowship, in lieu of the Annual Contribution, shall be £15 15s.

4. The Annual Contribution shall become due on the 1st day of January in advance: any Fellow elected after September will not be called upon for his Contribution for that year, unless he desires to receive the Transactions of the Society for the year in which he is elected.

Proposal.—Delete present Chapter and substitute:

Section 1. Every Fellow upon his election shall pay the sum of Three Guineas for his Admission Fee, and if any Fellow shall fail to pay such sum within six months after his election the said election shall become void.

Section 2. Every Fellow shall upon his election pay the first Annual Contribution of Two Guineas, and if any Fellow shall fail to pay such sum within six months after his election the said election shall become void. He shall pay the like sum annually in advance on the 1st day of January in each year, provided however that any Fellow elected after September in each year will not be called upon to pay his Contribution unless he desires to receive the Transactions for the year in which he is elected.

Section 3. Every Fellow elected before January 1st, 1921, shall pay the Annual Contribution of Two Guineas unless he does not desire to receive the Publications of the Society, in which case his Annual Contribution shall be One Guinea per annum.

The TREASURER having explained the financial necessity for these alterations, Mr. KAYE proposed as an amendment that the words "unless the Council shall otherwise decide" should be added after the word "void" in Section 1: seconded by Mr. H. J. TURNER and carried. The section as amended was then carried on the motion of Mr. DURRANT, seconded by the TREASURER.

Lord ROTHSCHILD proposed as an amendment in Section 2 that the same words be added after the word "void." This was seconded by Mr. DURRANT and carried, and the amended section was passed on the motion of Mr. BETHUNE-BAKER, seconded by Lieut. ASHBY.

Section 3 gave rise to several questions and considerable discussion. Mr. DONISTHORPE raised the question whether it would be legally possible to raise the subscription of Fellows already elected, and the TREASURER replied that legal opinion had been taken, and that it was permissible, the Charter giving power to the Society to alter *any* bye-laws. Mr. LLOYD pointed out that the wording of the section might be held to include those who had already paid a life composition. It was explained that their position was unassailable, but eventually it was proposed by Mr. LLOYD, seconded by Mr. SIMES, and carried, that the words "Except in the case of those who have already compounded" be added at the beginning of the section. A long discussion took place as to the position of those who continued to pay a guinea subscription, and Mr. MAIN proposed and Mr. TURNER seconded an amendment that the word "Transactions" be substituted for "Publications." This was carried by 24 votes to 20, and the section with both amendments was then carried on the motion of Mr. BETHUNE-BAKER, seconded by Mr. S. EDWARDS.

[The general effect of the new Bye-law will be that all Fellows, wherever residing, elected after January 1921 will pay an entrance-fee of three guineas, that life compositions (apart from those already effected) are abolished, and that the usual subscription for all Fellows will be two guineas, but that Fellows elected before January 1921 have the option of continuing to pay one guinea, receiving only the Proceedings and not the Transactions of the Society.]

CHAP. XIV. *Withdrawal and Removal of Fellows.*

3. In the month of November in each year the Council shall cause to be suspended in the Library of the Society a list of the Fellows who owe more than two Annual Contributions. If the Contribution due from any Fellow named in the said list shall not have been paid within three months after the first suspension of the list, the Council may remove such Fellow from the Society, but notwithstanding such removal any Fellow so removed shall continue liable to pay, and may be sued for the recovery of any money due from him to the

Society. The Council may remit wholly, or in part, the Entrance Fee payable by any former Fellow rejoining the Society.

Proposal.—Delete, in Section 3, the words “ In the month of November,” and substitute for them the words “ On the first day of September.”

Section 3, line 10, after the word “ Society,” insert “ The Council may cause the name of any Fellow removed under this Section, with the reason for his removal, to be printed in the Proceedings of the year in which they are removed.”

Section 3, delete the words in the 11th and 12th lines, “ Entrance Fee payable by any former Fellow rejoining the Society ” and add “ The Contributions due from any Fellow.”

The first and third alterations were passed without discussion, the former on the motion of Mr. LLOYD, seconded by Dr. MARSHALL, and the latter on that of Mr. WHEELER with the same seconder. An amusing discussion took place on the grammatical aspect of the second suggested alteration, which was eventually adopted on the motion of Mr. TURNER, seconded by Lieut. ASHBY, with the substitution of the words “ he is ” for “ they are ” in the last line.

CHAP. XV. *Privileges of Fellows.*

3. A Fellow shall not be entitled to vote on any occasion until he shall have paid his Contribution for the year last past.

Proposal.—Delete present Section 3 and substitute the following :

Section 3. No person shall have his name printed in the Annual List of Fellows of the Society, until such person shall have paid the Admission Fees and signed the obligation for the payment of Annual Contributions, and no such person shall have liberty to vote at any Election or Meeting of the Society before he shall have been admitted as directed in Chapter XII, Section 4.

Adopted on the motion of Dr. ELTRINCHAM, seconded by Mr. DURRANT.

Proposal.—After CHAP. XVII.

Add a new Chapter headed *Benefactions*.

Section 1. In the printed Proceedings of the Society an annual record shall be kept of all donations, so far as known, that have at any time been made to the Society, of the value of £30 and upwards.

Section 2. In every volume presented to and accepted by the Society, a notice shall be inserted, and when necessary be renewed, containing the name of the donor and the date of the gift.

Adopted on the motion of Dr. NEAVE, seconded by Mr. DURRANT.

CHAP. XIX. *Special Meeting.*

1. Upon the requisition of six or more Fellows, presented to the President and Council, a Special General Meeting of the Society shall be convened;

Proposal.—Section 1. Add before the words “upon the requisition” the words “By resolution of the Council or.”

Adopted on the motion of Mr. DURRANT, seconded by Lord ROTHSCHILD.

CHAP. XX. *Annual Meeting.*

1. The Annual Meeting of the Society shall be held on the third Wednesday in January.

2. The objects of the Meeting shall be to receive from the Council, and hear read, their Annual Report on the general concerns of the Society; and to elect the Council and Officers for the ensuing year.

Proposal.—After Section 1, insert new Section 2 as follows :

“Notice of the Annual Meeting shall be sent to every Fellow whose last known residence shall be in the United Kingdom, at least seven days before such Meeting shall take place.”

To present Section 2, after the word “Society” in the 3rd line, add the words :

To receive from the Treasurer, and hear read, his report, and the Statement of the Society's financial affairs.

The first proposal was adopted on the motion of Dr. GAHAN, seconded by Mr. DONISTHORPE, the second on that of Lieut. ASHBY, seconded by Mr. KAYE.

The Rev. G. WHEELER said that the alterations in the Bye-laws would necessitate changes in the numbers of several Chapters and sections, and asked (in case it should be thought necessary) for authorisation to make such changes, which was accorded.

The TREASURER said there was still one amendment needed, as on removal to other premises it would be necessary for the Society to avail itself of the Statute relieving Literary and Scientific Societies from rates and taxes; one of the two necessary conditions was provided for in the present Chapter XXIII, but it was not definitely stated in the Bye-laws that the Society was exclusively a Scientific one; he therefore thought it would be well that the 1st Chapter should read:—

CHAP. I. *Object.*

THE ENTOMOLOGICAL SOCIETY OF LONDON is a Scientific Society: instituted for the improvement and diffusion of Entomological Science exclusively.

It was proposed by Mr. BETHUNE-BAKER, seconded by Dr. CAMERON, and carried that this alteration be adopted.

Lord ROTHSCHILD then proposed and Mr. LLOYD seconded a motion that the Bye-laws as now amended be adopted, which was carried.

Ordinary Meeting.

Election of Fellows.

Mons. F. LE CERP, Curator of the Lepidoptera in the Paris Museum, 13, rue Guy de la Brosse, Paris; Miss ALICE ELLEN PROCT, Lane End, Hambledon, Surrey: and Messrs. W. H. TAMS, 8, Whitla Road, Manor Park, E. 12, and ALFRED E. TONGE, Ashville, Trafford Road, Alderley Edge, Cheshire, were elected Fellows of the Society.

Exhibitions.

ZYGAENAS OF THE TRANSALPINA GROUP.—Lord ROTHSCHILD exhibited a long series of *Zygaenas* of the *transalpina* group together with a series of *Z. ephialtes* showing parallel variation, and Mr. BETHUNE-BAKER in illustration exhibited with the epidiascope a number of slides showing the differences in the genital armature of the various species.

The exhibitors contributed the following "Preliminary notes towards a revision of the *transalpina* group of the genus *Zygaena*."

In February last the junior author [Lord Rothschild] undertook to exhibit a series of forms of *Z. transalpina*, Esp., and a series of *Z. ephialtes*, L., to illustrate the curious parallel variation. However, on going into the question it was found that there were several species mixed up under the name of *transalpina*. We therefore thought it advisable, at the same time as the exhibit was made, to give a preliminary account of the several species, and at least point out their specific distinctions. The various species, races and aberrations hitherto referred to *transalpina*, Esp., have been reviewed most exhaustively by Monsieur Oberthür, Count Turati, Dr. Verity, Herr Dziurzynski and Signor Rocci, but we have failed to find anything upon the genital armature. We therefore thought it advisable to show on the screen a series of slides of the genitalia of the various insects hitherto united under *transalpina*, and also a few other species for comparison.

As Esper described his *transalpina* from Italy it is advisable to take the Italian forms first. Contrary to the opinion of Count Turati and Dr. Verity, the genital armature shows that we have two distinct species, confused under *transalpina*, inhabiting Italy. The one is a larger, more robust species, while the other is more slender and smaller; in many parts of Italy these occur together.

Esper described his *transalpina* from Verona, and of the series exhibited the four from Florence agree most closely with his description and figure. The larger, more robust species raised some difficult questions as to nomenclature. The two oldest names given to a form of this species are

boisduvalii and *xanthographa*. Almost unanimously entomologists have quoted Costa as the author of the name *boisduvalii*, which would have made this the correct name for the species by the law of priority. On looking this up, however, we found that no such name was given by Costa, who, in his "Fauna del Regno di Napoli," vol. v, p. 14, describes a black and yellow *Zygæna* under the heading of "No. 11, Z. della stecade, Z. stoechadis, var. n." The name *boisduvalii* was first given to Costa's description by Heydenreich in his "Lepidopterorum Europæorum Catalogus Methodicus Systematicus Verzeichniss der Europæischen Schmetterlinge," 1843, and therefore must stand as *boisduvalii*, Heydenr., not Costa as it is always quoted.

Dziurzynski in 1908 gives *boisduvalii* as the form with five spots, while *xanthographa* is given as having six spots. Germar in his description of *xanthographa* distinctly states that it has five spots, therefore as *xanthographa* Germar dates from 1837-38, while *boisduvalii*, Heydenr., dates from 1843, *boisduvalii* is a pure synonym of *xanthographa*.

So far as we have studied these insects, we can record five subspecies of *xanthographa*, viz. *xanthographa xanthographa*, Germ.; *xanthographa maritima*, Oberth.; *xanthographa pseudomaritima*, Turati; *xanthographa transiens*, Rocci, and a new form from Moulinet, Switzerland, *xanthographa helvetica*, subsp. nov., which I here diagnose.

Zygæna xanthographa helvetica, subsp. nov., differs from *x. maritima* in the much smaller red spots on the fore-wing and dark blue ground-colour, narrower black border to hind-wing, and large size.

Habitat, Moulinet, Switzerland.

Of *transalpina*, Esp., so far we can with certainty distinguish two subspecies: *transalpina transalpina*, Esp., and *transalpina altitudinaria*, Turati, and most likely a third can be recognised as *transalpina latina*, Vrtý.

Whether when we have concluded our final study of this group it will be possible to separate further local races of *xanthographa* and *transalpina*, or if the enormous mass of further names given to these two species by Count Turati, Dr. Verity, Signor Rocci, and M. Oberthür only represent indi-

vidual aberrations cannot at present be decided. North of the Italian peninsula are certainly found three species, and probably the Pyrenaeic and Basses Alpes form, hitherto united with *alpina*, will prove to be a fourth.

Zygaena alpina, Berce, is confined to the Alps proper, Savoy and the Pyrenees (if the latter proves distinct, *alpina* would be restricted to the Alps and Savoy).

Zygaena astragali, Bkh. = *hippocrepedis*, Hbn., is the Central European species of the *transalpina* group and is found in Germany, Austria, Belgium, Holland, etc. Borkhausen's name dates from 1793, and so has twelve years priority over Hübner's of 1805.

Zygaena centralis, Oberth., is the name that must stand for the French species, which so far can be divided into three subspecies as follows: *centralis centralis*, Oberth.; *centralis occidentalis*, Oberth.; and *centralis provincialis*, Oberth. We have too little material from Central Europe to find out whether there are more subspecies than one treated of under *astragali*, but there is little doubt that there are several.

We hope later to publish a complete revision of this group of *Zygaenae* founded on the characters of the genitalia, but we thought these notes ought to be made public as soon as possible.

Appended are the senior author's notes on the genitalia.

Zygaena taurica, Dz., is a distinct species and not a race of any of the preceding ones.

Notes on the Genital Armature.

In the genitalia of the *Zygaenidae* the form of the tegumen and the armature of the aedeagus are perhaps the most important characters, they are certainly the characters where the differences are most easily seen; there are, however, minor distinctions in the harpagines or clasps, but as these organs are generally large and broad the difference in shape is not so readily seen.

Z. filipendulae, L., Pl. A, fig. 1, has the tegumen extended into two long narrow digitate sclerites, the armature of the aedeagus is mostly confined to the upper part of the sheath, and consists of a row of long, strong, tusk-like dentitions, with

a close-set smaller series of dentate projections becoming mere shagreening in the rear; the harpagines are very large.

Z. filipendulae manni, H.-S. Pl. A, fig. 2. The genitalia of this high alpine race show at once its very close relationship to Linné's species, the organs are not quite so large, but are otherwise similar.

Z. stoechadis, Bkh. Pl. A, fig. 3. These organs also prove its near relationship to *filipendulae*; the harpagines are, however, smaller and the armature less formidable, whilst the armature is more extensive on the lower margin of the sheath.

Z. ephialtes, L., Pl. A, fig. 4 (ab *peucedani*, Esp., examd.), has the tegumen barely half the length of *filipendulae*; the bifurcate sclerites are also much broader; the armature has long fine teeth and is closely beset with smaller dentition; the harpagines are also different in shape.

Z. loniceræ, Sch. Pl. B, fig. 5. The tegumen is shortly bifurcate; the armature has the dentition shortish, but the close-set area is very extensive; the harpagines are large and broadly oval.

Z. trifolii, Esp., Pl. B, fig. 6, has quite different harpagines; the armature has long, strong teeth, and is decidedly less extensive.

Z. angelicæ, O. Pl. B, fig. 7. This is quite a distinct species from any of the preceding ones, and is allied to the *transalpina* group; the tegumen is bifurcate with irregular broad sclerites; the armature extensive, with very large tusk-like teeth on both upper and lower portions, whilst the clasps are narrower.

Z. centralis, Oberth., Pl. B, fig. 8, is allied to *angelicæ*; the bifurcate tegumen is longer and slightly humped; the armature with smaller dentition, and the harpagines different in shape, being squarer.

Z. astragali, Bkh., Pl. C, fig. 9, is a very close ally of *centralis* and *angelicæ*; the tegumen is different, with a marked hump, it is broad and lobe-shaped; the armature is similar, with largish teeth; whilst the clasps are larger and oval.

Z. alpina, Berce, Pl. C, fig. 10, has the tegumen with longer bifurcation, and the shape of the digitate sclerites differs; the armature is extensive, with two rows of strong teeth; the clasps are broad, hairy and different in shape.

Z. xanthographa, Germ., Pl. C, fig. 11 (*x. maritima* examd.), is not the same species, I believe, as *alpina*; the bifurcate tegumen has the sclerites decidedly broader and bolder; the armature is very similar, but the harpagines decidedly narrow and different in shape.

Z. transiens, Rocci, Pl. C, fig. 12, D, 13 is evidently a form of *xanthographa*, with its narrow harpagines and longer bifurcation of the tegumen.

Z. transalpina, Esp., Pl. D, fig. 14, is certainly a different species; it has the tegumen shortly bifurcate with broad sclerites; the armature has quite small teeth with peculiar shagreening that is rather extensive; but the armature on the lower margin of the penis sheath is much reduced and finer, and the harpagines shorter and squarer.

Z. latina, Vrtz., Pl. D, figs. 15, 16, is evidently a race of *transalpina*, all the organs being similar.

Z. alpina and *transiens* on one slide, showing the differences mentioned.

alpina and *transalpina* on one slide, showing the differences mentioned.

transiens and *latina*, yellow form, showing the differences mentioned.

Z. filipendulae, ♂ and ♀, in cop., showing the position of the various organs.

The following specimens and slides were exhibited:—

Zygæna transalpina, Esp., 171 specimens including the subspecies *alutudinaria*, Trti, and the named aberrations *hexamaculata*, Trti, *rhodomelas*, Trti, and *flava*, Vrtz.

Z. xanthographa, Germ., 130 specimens including the subspecies *maritima*, Obth., *pseudomaritima*, Trti, and *helvetica*, B. Baker and Rothsch., and the named aberrations *zickerti*, Hoffm., *diffusa*, Rothsch., *sexmaculata*, Dz., *sorrentina*, Stdgr., *sexmacula*, Dz., *calabrica*, Colb., *trimacula*, Obth., *depuncta*, Trti, and *pseudosorrentina*, Trti.

Z. taurica, Dz., 9 specimens.

Z. centralis, Obth., 70 specimens including the subspecies *occidentalis*, Obth., and *provincialis*, Obth., and the named aberrations *mitosa*, Caud., and *cingulata*, Hirschke.

EXPLANATION OF PLATES.

PLATE A.

- No. 1. *Zygæna filipendula*, from Isle of Wight (8708).
2. „ *v. manni*, from Pontresina (303).
3. „ *stoechadis*, from Central Italy (8704).
4. „ *peucedani*, from Brussa, Asia Minor (206).

PLATE B.

- No. 5. *Zygæna loniceræ*, from Macugnagna (987).
6. „ *trifolii*, from Devonshire (8701).
7. „ *angelicæ*, from Austria (8710).
8. „ *centralis*, from Mende Causse, France (368).

PLATE C.

- No. 9. *Zygæna astragoli*, from Jena (370).
10. „ *alpina* (*transalpina* Auct.), from Tyrol (291).
11. „ *xanthographa maritima*, from Italy (388).
12. „ *xanthographa transiens*, from Italy (265).

PLATE D.

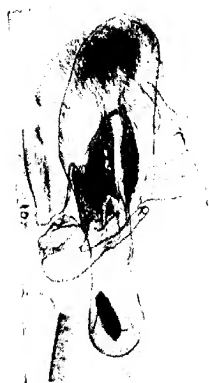
- No. 13. *Zygæna xanthographa transiens*, vertical position, from Italy (260).
14. „ *transalpina altitudinaria*, from Italy (259).
15. „ *transalpina latina*, from Italy (239).
16. „ *transalpina latina*, vertical position, from Italy (235).



GENTILIA OF ZYGÆNID, E.



GENITALIA OF ZYGAEID.E.



GENITALIA OF ZYGAENIDÆ.



GENITALIA OF ZYGAENIDÆ.

Z. astragali, Bkh., 22 specimens including the named aberrations *flava*, Kaufm., and *flavescens*, Kaufm.

Z. alpina, Berce, 80 specimens.

SLIDES OF GENITALIA :—*Z. filipendulae*, L.; *Z. filipendulae manni*, H.-S.; *Z. stoechadis*, Bkh.; *Z. ephialtes*, L., ab *peucedani*, Esp.; *Z. loniceræ*, Sch.; *Z. trifolii*, Esp.; *Z. angelicæ*, Ochs.; *Z. centralis*, Obth.; *Z. alpina*, Berce; *Z. xanthographa maritima*, Obth.; *Z. xanthographa transiens*, Rocci; *Z. transalpina*, Esp.; *Z. transalpina latina*, Vrtý.; *Z. alpina* and *transiens* on one slide; *Z. transalpina* and *alpina* on one slide; *Z. transiens* and *latina flava* on one slide; *Z. filipendulae*, ♂♀, in copulation, to show the position of the various organs.

A METHOD OF COLLECTING AND STORING INSECTS, ETC., FIXED TO LEAVES, WITHOUT PRESSURE.—Mr. C. B. WILLIAMS showed the following method :—

A small round shallow pill-box, with or without a glass lid, is taken and the inner cardboard ring separated from the rest of the box. For collecting the lid of the box with this inner ring in it is placed over the specimen on the leaf and the rest of the box beneath. On pressing the two halves of the box together the leaf with the specimen on it is pressed to the bottom of the box, where it is protected and kept in position by the cardboard ring, which is pushed back into its original position.

NEW AND LITTLE-KNOWN AUSTRALIAN INSECTS.—Mr. DEUQUET, who was present as a visitor, exhibited a number of Australian insects of various orders, many of which were still undescribed and unnamed.

Wednesday, June 2nd, 1920.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

Election of a Fellow.

Engineer-Commander S. T. STIDSTOW, R.N., H.M.S. Douglas, South Queensferry, was elected a Fellow of the Society.

Death of a Fellow.

The death was announced of Dr. LEONARD DONCASTER, a distinguished Fellow of the Society.

Exhibitions.

A CASE OF PARTHENOGENESIS IN *LASIOCAMPA QUERCUS*, L.—Lord ROTHSCHILD exhibited 43 specimens of *Lasiocampa quercus*, of which he gave the following account:—

In 1919 Dr. K. Jordan collected at Hartland Quay, Devonshire, two or three larvae, from one of which the ♀ was hatched which was exhibited to-night with 42 of her offspring. This ♀ laid 193 eggs, from which some 150 larvae hatched, although no ♂♂ had been near the ♀ and no copulation could have taken place, as the cocoon was a solitary one in the breeding-cage. Of these 150 larvae some 75 were sleeved out of doors at Ashton Wold, and the rest were placed, with ivy as food, in a hothouse at Tring. All the sleeved larvae died; but from the hothouse-reared batch 56 cocoons were obtained, from which 43 specimens had so far emerged. Of these, one of two ♀♀, which emerged on 23rd of April, 1920, laid a number of eggs, which unfortunately were not counted; but from these there are now feeding 32 larvae, again on ivy in the hothouse. This ♀ was also unfertilised, so that we have here an extreme case of parthenogenesis persisting through two generations.

The parent ♀ and the offspring were exhibited on behalf of his niece, Miss Miriam Rothschild.

Mr. P. A. BUXTON inquired what was the proportion of the sexes in the original brood, and Lord Rothschild replied that out of 43 specimens 14 were females. The PRESIDENT, Dr. GAHAN and Mr. C. B. WILLIAMS gave instances of cases of parthenogenesis in Bombycid and Arctiid moths, but no instance was known of its persistence in a second generation.

INTERESTING INSECTS FROM NEW ZEALAND & AUSTRALIA.—Dr. R. J. TILLYARD exhibited two dead larvae of *Sabatinca barbarica* from New Zealand, one about half grown, the other full fed. The latter was brought alive from New Zealand in a

jar of moss, but succumbed to the heat of the tropics. He also showed two slides of microscopical preparations from a third larva, including the mouth-parts, antennae and armature of the cuticle. Dr. Tillyard also exhibited a gigantic undescribed species of *Heterojapyx* from Sydney, specimens of which have been found more than two inches long when alive. A dissection of this insect revealed the interesting fact that vestiges of the Malpighian tubules are present in the form of a circle of six small evaginations of the anterior end of the hind-gut. A further exhibit was a set of tubes showing the eggs, larvae, pupae and imagines of the remarkable Australian Moth-lace-wing, *Ithone fusca*. The eggs are laid in the sand and hatch out into little white melonthead-like grubs, which burrow downward and attack the larvae of *Scarabaeidae*. The mouth-parts are very small, but of the true planipennian sucking type; the head is reduced, eyes absent, and the fore-legs formed for burrowing. The larva gives out a delightful scent of lemon essence. The pupa is enclosed in a cylindrical cocoon with rounded ends, formed of a white papery substance, like that made by some Hymenoptera. The imago superficially resembles a Hepialid moth. It flies only at sunset, the males assembling in dozens round the females on tree-trunks.

EXAMPLES OF GYNANDROMORPHISM IN LEPIDOPTERA.—
Mr. TALBOT, on behalf of Mr. J. J. JOURNEY, exhibited the following Gynandromorphs:

Papilio castor, Westw.—The left side is female. The right side is a mixture of both sexes.

Teracolus pleione, Klug.—A specimen taken at Aden, from the collection of Lieut.-Col. Nurse. Left side male, right side female, with patches of orange on hind-wing.

Delias descombesi leucacantha, Fruh.—A specimen from Sikkim from the collection of H. J. Elwes. Left side male, right side female.

Amorpha populi.—Two specimens received from the firm of Staudinger and Bang-Haas. One specimen with the right side male, and left side female, with left hind-wing partly male. Second specimen with right side male, left side female with apparently an admixture of male elements.

Dendrolimus pini.—Seven specimens received from the

firm of Staudinger and Bang-Haas. The following information was furnished us by Herr Bang-Haas :—

The species was met with in 1918 as a very noxious pest which destroyed a large part of the fir woods in Pommern and Brandenburg. All the country and school children were engaged in destroying the moth. A careful examination was made of 100,000 specimens, with the result that seven gynandromorphs were found. Specimens 1 and 2 have right side male and left side female. No. 3 has right side female and left side male. No. 4 has right side with male antenna, fore-wing female, hind-wing mostly male; left side with female antenna, wings male. No. 5 has right antenna female, left antenna male, and wings female. No. 6 has both antennae male, right fore-wing male, right hind-wing mostly female; left wings female. No. 7 has right side male; left antennae with reduced pectinations, left wings female. We note that eight fore-wings are female, and six are male; seven hind-wings are female, two are intermediate, and five are male. A full account with figures of these gynandromorphs will be published later.

NEW AND RARE LEPIDOPTERA.—Mr. TALBOT also exhibited the following species :—

A pair of the very rare alpine species *Eriogaster arbusculae*, Frr., bred by Herr Standfuss from larvae obtained in the Upper Engadine at 1800 metres. In 1912 10,000 larvae were reared, but out of these only 20 ♂♂ and 10 ♀♀ could be obtained. A full account of the life-history has been given by Standfuss in the "Mitteilungen der Entomologia," Zurich, 1916.

Papilio leucassori, Ob.—Described in 1890 from a single specimen. Two others exist in the Paris Museum. This remarkable species belongs to the *leonidas* and *brasidas* group according to a study of the genitalia made by Monsieur F. Le Cerf of the Paris Museum. It is wrongly placed by Aurivillius in the *uculegon* group. The species is only known from the Great Comoro Island.

Salamis augustina, Bbv.—A male specimen from Reunion Island. Also occurs in Madagascar. A male specimen from Mauritius formerly in the collection of the late Roland Trimen.

This specimen represents an undescribed race. Only one other individual has been preserved and exists in the Port Louis Museum. The form is evidently now extinct. An interesting discussion of this species by the late Colonel Manders appeared in the Trans. of the Society for 1907.

Acraea, sp. nov., from the district of Lake Kivu, Central Africa, taken by Mr. T. A. Barns. Belongs to the *sotikensis* group.

Callioratis abrazas, Feld.—A new race from Nyassaland. The typical form is very rare and inhabits S. Africa.

Papilio euterpius, G. & S.—A specimen of the female. Only one other is known to exist in collections, and that also is contained in Mr. Joicey's collection, having been received with the Grose-Smith collection, and referred to in "The Revision of S. American Papilios," by Rothschild and Jordan.

Eunica chlorochroa, Salv.—Three aberrations of this species from S. Peru. Aberrations of this genus are rare, being even more common in *Catagramma*. The aberrations exhibited are of the underside only and represent an increase of the black markings.

THE WEAVER-BIRD OBSERVED EATING BUTTERFLIES BY W. A. LAMBORN.—Prof. POULTON said that he had now received, forwarded from Kuala Lumpur, F.M.S., the bird seen to catch and eat the Pierine *Catopsilia florella*, as described in Proc. Ent. Soc., 1920, p. xxvi. The specimen, exhibited to the meeting, had been kindly named for him by Mr. Charles Chubb of the Ornithological Department of the Natural History Museum. It was *Hyphantornis nigriceps*, Layard, one of the Weaver-birds (*Ploceidae*).

Dr. H. ELTRINGHAM stated that he had made an examination of the contents of the tubes containing material from the stomach and intestines of the bird taken by Mr. Lamborn and dated 10.12.19. In both the material was in a fine state of maceration. A small portion of the mass examined with a $\frac{1}{2}$ in. objective showed many traces of butterfly remains. Fragments of the proboscis and of the corneal layer of the eye were easily observed, whilst it was difficult to move the slide into any position in which there were not one or more lepidopterous scales to be seen in the field. He had consulted with Dr.

F. A. Dixey as to whether it would be possible definitely to recognise scales of *Catopsilia florella*, but unfortunately the scales of this butterfly are not very distinctive. The examination showed how rapidly all ordinarily visible traces of lepidopterous remains are obliterated by the digestive processes of the bird, and how useless would be the investigation of the contents of birds' stomachs except by careful observation under the compound microscope. He had also examined some faeces of a wagtail dated 16.12.19, but had not found traces of Lepidoptera in same.

THE RECENT DATE OF THE INVASION OF MADAGASCAR BY *HYPOLIMNAS BOLINA*, L.—Prof. POULTON said that a few weeks ago he had received the following message from M. Charles Oberthür, whose vast experience of Malagasy butterflies made the negative evidence unusually valuable. By a curious coincidence M. René Oberthür received an example of the species on the very day when the question was asked and answered.

“May 16, 1920. Rennes.

“My brother has received the Indian form of *Hypolimnas bolina*, to day, from Vangaindrano, in the southern part of Madagascar. I have not hitherto received the Indian form from this island.”

It would be remembered that Archdeacon Kestell-Cornish, now Bishop of Madagascar, considered that *bolina* first appeared in 1912 or a little earlier (Proc. Ent. Soc., 1916, p. xxiii).

Papers.

The following papers were read:—

“Five years observations (1914–1918) on the bionomics of Southern Nigerian Insects, chiefly directed to the investigation of Lycaenid life-histories and the relations between Diptera and ants, by the late CHARLES OGILVIE FARQUHARSON, M.A., B.Sc., Aberdeen.” Edited, with a brief life of the author, by EDWARD B. POULTON, D.Sc., M.A., F.R.S., Hope Professor of Zoology in the University of Oxford, Fellow of Jesus College, Oxford. With a systematic and descriptive Appendix by R. S. BAGNALL, G. T. BETHUNE-BAKER, J. F. COLLIN, J. HARTLEY DURRANT, F. W. EDWARDS, Dr. HARRY

ELTRINGHAM, D.Sc., M.A., Dr. J. B. GATENBY, D.Phil., Prof.
R. NEWSTEAD, F.R.S., Dr. J. VILLENEUVE, and Rev. J.
WATERSTON.

In bringing forward the paper Prof. POULTON exhibited the whole of the Lycaenine butterflies belonging to *Argiolanus* and allied genera bred by Mr. Farquharson from larvae feeding on the flowers of *Loranthus*; also a number of bred *Lycaeninae* and *Lipteninae* with their respective pupa-cases, showing the wide difference between the two types of pupae. He also exhibited examples of the Diptera described in the Appendix by Mr. J. E. Collin and Mr. F. W. Edwards, and a series of the Asilid fly *Philodius tenerarius*, Walk., from Agege, near Lagos, with its very varied prey.

"A contribution to the knowledge of the Anthomyid Genera *Hammonyia* and *Hylephila* of Rondani (Diptera)," by J. E. COLLIN, F.E.S.

"Experiments on the relative edibility of Insects with special reference to their coloration," by G. D. HALE CARPENTER, D.M., B.Ch., F.E.S.

Both these papers were illustrated by the epidiascope.

In answer to several inquiries Dr. Carpenter explained that the edibility of insects was always relative, and that positive inedibility was almost non-existent.

Wednesday, October 6th, 1920.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

Election of Fellows.

Messrs. A. M. ALTSON, 26, Addison Mansions, Blythe Road, West Kensington; HUBERT MEREDYDD MORRIS, M.Sc., Institute of Plant Pathology, Rothamsted Experimental Station, Harpenden; SYDNEY DOUGLAS-CROMPTON, Villa Helvetia, Costebelle, Hyères, France; J. C. M. GARDNER, Entomological Dept., Royal College of Science, S.W.7; BERNARD SINCLAIR GOODBAN, Bracmar, Belvedere Road,

Upper Norwood, S.E. 19; HARRY HARGREAVES, Entomological Dept., Royal College of Science, S.W. 7; CHARLES MCFARLANE INGLIS, M.B.O.U., F.Z.S., Baghownie Factory, Laheria Sarai, Bihar, India; DOUGLAS JOHNSTONE, Brooklands, Rayleigh, Essex; Capt. ARTHUR LESLIE KENT-LEMON, York and Lancaster Regt., c/o Postmaster, Khartoum, Sudan, and Blytheswood, Ascot, Berks; Messrs. W. H. J. PRIOR, Culham, Main Road, New Eltham, Kent; PHILIP BERNARD RICHARDS, Agricultural Dept., Kuala Lumpur, Federated Malay States, and 52, Longridge Road, Earl's Court, S.W. 5; Lieut. J. SEABROOK, Fern Bank, Bakewell, Derbyshire; and Mr. JOHN WILLIAM SPENCER, 5, Dogford Road, Rayton, Oldham, Lanes., were elected Fellows of the Society.

The Society's New Quarters.

The TREASURER gave an account of the present position of the negotiations for new quarters for the Society, saying that No. 41, Queen's Gate was now almost certainly secured; the cost of the Freehold, re-decorating and furnishing would be about £9000, towards which a considerable sum in donations and loans had already been promised. He urged upon the Fellows the duty of supporting this project. The PRESIDENT, the Rev. F. D. MORICE and Mr. BETHUNE-BAKER also spoke in support of the scheme. Mr. ROWLAND-BROWN suggested approaching the Dept. of Agriculture with a view to obtaining assistance, and also proposed a vote of thanks to Mr. Sheldon and the sub-committee, which was seconded by Dr. COCKAYNE and carried unanimously.

Exhibits.

ORNITHOPTERA RUBIANUS.—Mr. A. DICKSEE exhibited 5 males of *O. rubianus* from Ronongo, the westernmost of the Solomon Islands, two specimens only being previously known; he pointed out that no two specimens were alike; they were taken in January and February.

MERMITHOGYNES OF ACANTHOMYOPS (DONISTHORPEA) NIGER, AND AN EARWIG WITH RUDIMENTARY FORCEPS.—Mr. DONISTHORPE exhibited a number of mermithogynes of *Acanthomyops (Donisthorpea) niger*, L., taken in a populous nest of this ant

situated under a large flat stone near a small stream running into the sea at Mother Ivey's Bay, N. Cornwall, on July 7th, 1920. Also a number of the worms extracted from the gaster of the ants. One or two worms occurred in each ant. Nearly all of the mermithogynes possessed a curious hole in the thorax, a point not found before, the object of which was obscure. Numerous normal-winged females as well as mermithogynes occurred in the nest. The whole nest was carefully dug up and the colony brought home.

He mentioned that it was the first time he had personally taken these short-winged females, but that his colleague, Mr. Crawley, had done so on several occasions, and was working at a paper on the subject; Mr. Donisthorpe had therefore presented the nest to him.

Mr. Donisthorpe further exhibited a live specimen of the common Earwig (*Forficula auricularia*) taken near Wellington College on Sept. 13th last, the forceps of which were practically absent, being represented by the merest rudiments. He suggested that their absence was probably caused by the presence of some internal parasite.

Dr. IMMS and Mr. F. W. EDWARDS commented on this exhibit, and Mr. Donisthorpe, in replying, observed that the worker ants when attacked by this parasite became larger and developed some female characters.

HETEROCERA AND DIPTERA CHIEFLY FROM N. ITALY. Lieut. ASHBY exhibited a number of moths taken during the summers of 1918 and 1919 in the districts of Vicenza, Arquata Scrivia, and Turin; also a few from France, including *Liquicolor fureata* from St. Martin Vésuvie, and from La Granja, Spain.

He also exhibited the following Diptera from the above Italian localities. *Volucella zozmia*, *V. pellucens*, *V. inflata*, *V. inanis*, *Eristalis arbutorum*, *E. arnea*, *E. tenax*, *Oecyptera brassicaria*, *Leptis tringaria*, *L. scolopacea*, *Tipula maxima*, *Myriatropa florea*, *Phaeria crassipennis*, *Sphaerophoria dispar*, *Chrysotoxum maculatum*, *C. italicum*, *C. elegans*, *Milesia crabroniformis*, *Lophira maroccana*, *Echinomyia grosso*, *Bombylus medius*, *Brachypatrus vulgus*, *Catabomba pyrastri*, *Tabanus ater*, *Dasygogon tentorius*, *Sarcophaga carnaria*, *Xanthogramma citrofasciatum*, *Calliphora vomitoria*.

BUTTERFLIES FROM MESOPOTAMIA.—The Secretary read the following letter :—

"26 Dec. 1919,
" (MOSUL).

" DEAR SIR,

" With reference to ' The Poverty of the Butterfly Fauna of Mesopotamia ' in a recent number of the Society's Transactions in which Prof. Poulton quotes a letter from Capt. P. A. Buxton, R.A.M.C., giving about 9 species as the total so far met with by that officer in Mesopotamia, it might interest you to mention that although this is probably about the number of species to be found at Amara (I saw a male *Ixias pyrene* close to me at some flowers there), many more species are to be found above Baghdad, about the low hills or ' jebels ' near the Persian and Kurdistan borders ; and I am acquainted with at least 42 species of Mesopotamia, having myself taken 31 of these species there, apart from some 14 more in N. Persia.

" Yours, etc.,
" H. D. PETLE
" (Lt.-Col., I.M.S.)."

Paper.

The following paper was read :—

" The full-grown Larva of *Lycaena euphemus*, Hb.," by T. A. CHAPMAN, M.D., F.R.S., etc.

Wednesday, October 20th, 1920.

Mr. W. G. SHELDON, F.Z.S., Vice-President, in the Chair.

Election of Fellows.

Dr. F. G. RAMBOUSEK, vii/1169 Prague, Czecko-Slovakia ; Messrs. WILLIAM F. SCHLUPP, B.Sc., The School of Agriculture and Experiment Station, Potchefstroom, Transvaal ; GEORGE HAROLD SKAIFE, M.A., Agricultural College, Cedara, Natal, S. Africa ; and ROBERT OWEN WAHL, B.A., Groot Fontein

School of Agriculture, Middelburg, Cape Province, S. Africa, were elected Fellows of the Society.

The New House.

The Chairman, as Treasurer, made a further statement as to the new house and mentioned that the cost of the Freehold was £6250.

Exhibitions.

ABERRATION OF BRENTHIS SELENE.—Mr. E. E. GREEN exhibited an interesting aberration of *B. selene*, taken at Camberley on the 24th of June last. The aberrant characters are more conspicuous on the underside of the wings. The spot at the base of the fore-wing is missing, and the markings on the outer border are diffused. On the hind-wing the ground-colour is silvery white, with a faint greenish tinge, while the usual red markings are largely replaced by a suffusion of black scaling. The upper surface has the black pattern on the hind-wing diffused, with the spots more or less confluent, those of the median series being united to form a continuous transverse band.

BUTTERFLIES (DELIAS: PIERINAE) MIGRATING IN EVENING FROM ONE VALLEY TO ANOTHER IN SELANGOR, F.M.S., AND BACK IN MORNING, ACCOMPANIED BY MOTH MIMICS (DYSPHANIA (EUSCHEMA) GEOMETRINAE), AND THESE AGAIN BY THEIR MOTH MIMICS (PSAPHIS: CHALCOSINAE: ZYGÆNIDÆ).—Prof. POULTON exhibited the following Lepidoptera from Bukit Kutu, in Selangor, close to the borders of Pahang, about 35 miles N.N.E. of Kuala Lumpur—a part of the collection made by Mr. A. R. Sanderson, as described in his letter printed on p. lxxv.

Delias ninus, Wall.,—3 ♂.

Delias pyramus, Wall.,—2 ♂ 1 ♀.

Dysphania (Euschema) glaucescens, Walk. (*regalis*, Butl.),—1 ♂ 2 ♀.

Dysphania (Euschema) militaris, L., f. *selangora*, Swinh.,—1 ♂.

Psaphis (Canerkes) camadeva, Dbl. (*semiplena*, Walk.; *resumpter*, Walk.)—1 ♂.

There could be no doubt that, as Mr. Sanderson states, all the species would resemble each other upon the wing; for the deep red of the *Delias* would then be the least conspicuous element in its pattern, while the general distribution of the black and blue-grey on all wings and yellow upon the hind, is similar in the Pierines and Geometers, the resemblance being heightened during flight by the likeness between the patterns of upper and under surface. In the male Chalcosine mimic, however, the resemblance depends almost entirely upon the under surface where alone is developed the essential feature contributed by the yellow. The female *Psaphis camadeva*, with the yellow markings strongly developed on both surfaces, was very similar to *Canerkes scotais*, Jord., and the larger species, *C. euschemoides*, Moore, all three being close mimics of *Dysphanias*. *C. euschemoides*, from Assam and "India," resembled *D. excubitor*, Moore, and the Indian form of *D. militaris*, L.; *C. scotais*, Jord., from Borneo—*D. subrepleta*, Walk.; the female of *P. camadeva* in Malacca, Borneo and probably in Java—*D. subrepleta*, and in the Philippine Islands—the allied *D. plena*, Walk.*

Although during flight, the female *P. camadeva* would resemble *D. glaucescens* and, far more closely, *D. militaris*, it was probable that the better model *D. subrepleta* and perhaps other *Dysphanias* would be found to accompany the *Delias* in their migratory flights in Selangor.

The existence of any significant likeness between these Geometers and *Delias* had never been hinted at before, and it was especially interesting that its recognition had been preceded and indeed suggested by the observation of associated habits and resemblance during life.

The combination was typically Müllerian, *Psaphis* belonging to a specially protected Family and Subfamily,† *Dysphania*

* The resemblance of these Chalcosine mimics to *Dysphania* (*Euschema*) is well known, as the name *euschemoides* clearly shows. Erich Haase speaks of this species as a mimic of *Euschema militare*, L., and *C. semiplena*, viz. *Psaphis camadeva*, female, from Minabassa, of a *Euschema*, doubtless *D. plena*, from the same locality. ("Researches on Mimicry, etc.," Pt. II, English trans., Stuttgart, 1896, p. 38.)

† *Hampsonia gulcherrima*, Swinh., from the Khasia Hills, allied to *Psaphis* and *Canerkes* is apparently as extreme an instance of Warning Colours as any known among insects. The ground-colour is black with

acting as a model as well as mimic, *Delias* being well known as a model for other Pierines, for Elymnines, Nymphalines and Chalcosiine moths other than *Psaphis*.

The facts now brought forward were quite new to Mr. Prout and Dr. Dixey, and they were so extremely interesting that it was to be hoped that the whole of the material collected by Mr. Sanderson and Mr. Harvey would be available for examination and the publication of a complete list, showing the proportions of the various species. It was also of the highest interest to repeat the observation, keeping separate the evening and morning streams of migration so as to compare the proportions of their constituents; also to investigate the areas reached by the two streams in order to determine the causes at work.

The exact conditions under which the migrations took place were of the highest interest and importance and it was very fortunate that they had been accurately noted by the captor, as would appear from the following letter, written May 11, 1920, from the Research Laboratory, Pitaling, F.M.S., to Mr. W. A. Lamborn, who had seen the specimens in Mr. Sanderson's collection and at once recognised the importance of the discovery:—

"The following data relating to the butterflies and moths you saw from Bukit Kutu may be of interest:—

"Altitude of old Government Bungalow 3457 ft.

"Period when insects taken 5th to 13th March, 1920.

"The butterflies and moths were noticed by Mr. T. R. Harvey and myself flying over the crest of the hill on which the old bungalow stands, first time March 4, 1920. The insects passed over from a deep valley about 5.30 p.m. to 6.45 p.m., sometimes two or three together at intervals of about one to two minutes and occasionally appearing in a more or less continuous straggling line for ten to twenty minutes. Generally a maximum number passed over in approximately

large bright yellow spots on the fore-wings and brilliant red and yellow markings on the hind. Another glaringly aposematic Oriental Chalcosiine, is the well-known *Campylotes histronicus*, Westw. The pattern of upper and under surface is similar in both these species, as it is commonly in the whole subfamily.

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an easterly direction about 6 p.m. From that time onwards the numbers steadily decreased. Many swallows were usually circling round at the time, but I did not see any of the insects taken. As a rule the insects were never more than about 20 ft. above the surface of the ground when passing the crest.

"The phenomenon was repeated in the opposite direction in the early mornings, 6.30-8 a.m., the numbers being approximately the same, so far as I could judge. Mr. T. R. Harvey captured some of the specimens in a similar manner to mine, viz. by standing in the narrow part of the ridge and utilising opportunities when the insects flew low (5-8 ft.). Odd specimens of the butterflies were taken during the day-time between 10 a.m. and 2 p.m., but in no case was a moth captured between these hours.

"The flight was repeated every evening and every morning while I was at the bungalow except that on two evenings, which were very wet, only a very small number passed over. The fact that large numbers passed back next morning suggests, however, that the insects may have flown over later the previous evening. There was not sufficient difference in the mode of flight for me to distinguish moths from butterflies, and in fact I did not notice the difference clearly until getting back here."

Dr. DIXEY made the following comments on *Delias* in the above communication:—

Of the six specimens of the Pierine genus *Delias* which are included among the insects received by Prof. Poulton as having formed part of the migratory flight observed at Bukit Kutu in Selangor, three (two males and a female) are *Delias pyramus*, Wall., and three (all males) are *Delias ninus*, Wall. These two forms of *Delias*, though closely allied, are quite distinct. The most obvious differences between the males are as follows:—

(1) In *D. pyramus* the yellow of the hind-wing upperside does not generally extend outwards further than to the 1st branch of the median vein; in *D. ninus* it always reaches at least as far as the 3rd median, and extends beyond this in the form of a slight yellow powdering usually as far as the 2nd branch of the subcostal.

(2) In *D. pyramus* the basal red of the hind-wing upperside is bounded by a well-defined dark band; in *D. ninus* the corresponding region of the wing is occupied by a broad patch of greyish-blue.

(3) In *D. pyramus* the marginal portion of the interspaces in the hind-wing upperside, external to the yellow patch, is occupied by a series of pale streaks; in *D. ninus* the corresponding area is almost uniformly dark.

The female of *D. ninus* was not described by Wallace, whose type is a male from Mount Ophir in Malacca: it is not mentioned by Fruhstorfer in Seitz's "Lepidoptera," and was unknown to Distant (*Rhopalocera Malayana*). The Adams Collection in the British Museum contains one specimen of the female, from Perak; and Dr. K. Jordan has kindly informed me that there are specimens of *D. ninus* ♀ in the Museum at Tring. The female in the Adams Collection is like the female of *D. pyramus* in having the red of the upper surface of the hind-wing bounded by a black band as in *D. pyramus*, not by a greyish-blue patch as in *D. ninus* ♂. On the other hand, the yellow of the hind-wing upperside is less suffused with dark scales than in *D. pyramus* ♀; and the outline of the fore-wing is rounded, not pointed as in both sexes of the latter insect.

D. ninus is so far as I am aware confined to the Malay Peninsula, though it has a representative in Sumatra and another in Borneo. I know of no example from further north than Penang. *D. pyramus*, on the other hand, is mainly a Himalayan butterfly; but its range extends to Burma, and there is a specimen in the British Museum from as far south as East Pegu. Mr. Distant does not include it in the text of his *Rhopalocera Malayana*, but inserts it in the Appendix to that work on the strength of an example captured by Egerton at Low's Hill in Perak. This was the most southerly record known to me until I saw the specimens now before us.* In view of what had hitherto been known of the respective habitats of these two species, it is somewhat surprising to

* It is worth noting that Von Mitis ("Iris," 1893, pp. 118, 119) describes a male specimen from Malacca which, though considered by Von Mitis to be a form of *ninus*, is in some respects transitional to *pyramus*.

find them taking part in the same flight, and at a point so far to the south of the usual range of *D. pyramus*.

A curious confusion has arisen with regard to *D. ninus* and another related form, which I may be allowed to take this opportunity of noticing. Mr. Wallace's original description of *ninus* had associated with it the figure of another species, *D. parthenope*, while his description of *parthenope* was illustrated by figures of the upper and underside of *ninus* (Trans. Ent. Soc. Lond., 3rd series, IV, p. 347, Plate VI, figs. 5, 5a; Plate VII, fig. 1). This mistake, corrected by Von Mitis (Systematisches Verzeichniss der Arten des Genus *Delias* Hübn.; "Iris," 1893, pp. 100, 117-122), by Mr. Butler in his Revision of the genus (Ann. Mag. Nat. Hist., 1897, pp. 163, 165), and by Mr. J. C. Moulton (List of the Butterflies of Borneo, Part IV, Nos. 564, 566; Journal of Royal Asiatic Society, Straits Branch, No. 67, December 1914), is passed over by Fruhstorfer in Seitz's work, and had not been rectified at the date of Mr. Distant's *Rhopalocera Malayana* (1882-1886). The latter author accordingly gives under *parthenope* (p. 291, Tab. XXIV, fig. 4) a description and figure which are those of *ninus*; while under *ninus* he reproduces Wallace's description of *ninus*, together with Wallace's figure called by Wallace *ninus*, but really representing that author's *parthenope*, a form of the nearly allied *D. aglaia* Linn. I am indebted to Dr. Jordan for drawing my attention to the fact that the interchange of Wallace's figures was first detected by Von Mitis (*loc. cit.*).

The substance of the preceding paragraph may be summarised as follows:—

WALLACE'S description of *ninus* is *ninus*.

His figure of *ninus* is *parthenope*.

His description of *parthenope* is *parthenope*.

His figure of *parthenope* is *ninus*.

DISTANT'S description and figure of *parthenope* are *ninus*.

His description of *ninus* (quoted from Wallace) is *ninus*.

His figure of *ninus* (reproduced from Wallace) is *parthenope*.

THE COLOUR OF THE LARVA OF *SMERINTHUS OCELLATUS*,
ON WILD CRAB.—Prof. POULTON said that during the past
September he had had the opportunity of confirming his early

observation that the larva of *S. ocellatus*, when feeding on the crab, gains a shade of green entirely different from that produced by the ordinary cultivated apple. The latter with their white undersided leaves produce larvae of a bluish-green tint below, becoming very pale, almost dead white, but still very faintly tinged with bluish-green, above; while the crab leaves with green under surfaces produce bright yellowish-green larvae with a pale yellowish dorsal surface. It was the recognition of the difference between *ocellatus* caterpillars on Siberian crab and other apple trees in his father's garden at Reading nearly fifty years ago which had first directed his attention to the power of individual colour adjustment in larvae, and, also inspired by the late Prof. Meldola's notes in Weismann's "Studies in the Theory of Descent," had led him to observe and experiment largely upon the species (Trans. Ent. Soc. Lond., 1884, p. 35; 1885, pp. 305-307; Proc. Roy. Soc., Vol. xxxviii, 1885, pp. 298-308; Vol. xl, 1886, pp. 135-173).

The tabular statement of all the experiments and observations, printed in the last-quoted paper, shows on p. 167 that three larvae found on crab (two at Reading on Siberian crab, one in 1884 at Oxford on wild crab) were of the yellowish-green tint, but that five larvae fed from the egg on cultivated crab in 1884, and nine on wild crab in 1885, were all of the usual bluish-green tint produced by ordinary apple. On pp. 160-161 the attempt was made to explain these and other irregularities. At the same time further observations of crab-fed larvae in the field were much wanted, but, until the present year, had not been obtained.

During a recent visit to Willersey, in the Broadway district, on the borders of Worcestershire and Gloucestershire, the wild crab was found to be extremely plentiful as a hedge-row bush, bearing small leaves with a green under surface. In the opinion of Mr. G. C. Druce the form was *Pyrus malus* var. *paradisica*, De C., and he would now substitute this determination for the name var. *acerba*, L., quoted from him in some of the above-mentioned papers. The shoots were observed to be extensively eaten, evidently by large larvae, and, although most of them had disappeared, two *ocellatus* in the last stage were found on a small bush on September 13 and one on a

larger bush four days later. All were bright yellowish-green forms, confirming the scanty earlier observations.

So many shoots of the bush on which the single larvae were found (September 17) were stripped bare that many larvae must have been at work. It was a common experience that these and other Sphingid larvae, when reared in confinement and at all crowded, are apt to nibble each other's horns off, and the same was true of the caudal forks of *Cerura vinula*, and, according to the experience of Mr. A. H. Hamm and Mr. J. Collins, of the elongated true legs and occasionally the caudal processes of *Stauropus fagi*. But Prof. Poulton had never heard of these injuries being inflicted upon Sphingid larvae in the wild state. It was therefore interesting to find that the horn of the last-remaining *ocellatus* had been nibbled down to a stump, and the injury probably explained the protracted development of the larva, for the loss of blood caused by these injuries was often considerable. The comparison between the three larval skins, thrown off at pupation, and exhibited to the meeting, showed the extent of the injury very clearly.

The period intervening between the cessation of feeding and the throwing off of the larval skin varied from about six to nine days. All three larvae produced male pupae.

The Rev. G. WHEELER remarked that he had many years ago in Berkshire bred *S. ocellatus* from larvae found on crab, and that only knowing the yellow-green larvae he had supposed on first seeing an illustration of the more usual form that it was wrongly coloured!

Wednesday, November 3rd, 1920.

Comm. J. J. WALKER, M.A., R.N., F.L.S., President, in the Chair.

Election of Fellows.

Messrs. THOMAS ALEXANDER BARNES, F.Z.S., 32, Windsor Court, Bayswater, London, W.; GEORGE BETHELL, F.R.Hist.S., 11, Chandos St., London, W.1; Major JOHN ERROL MORITZ

BOYD, M.C., B.A.M.C., Pendavey, Birclington-on-Sea; Miss MARY FRANCES COSSART BRIDSON, Ford Brow, Dartmouth; Messrs. THOMAS COCKCROFT, 111, Owen St., Wellington South, New Zealand; ERNEST CRABBE, 52, Sarsfeld Road, Balham, S.W.12; J. W. GRIFFEN, 27, The Summit, Liscard, Wallasey; ALISTER CLAVERING HARDY, 40, Harlow Moor Drive, Harrogate; VALENTINE KNIGHT, Assistant Director Raffles Museum, Singapore; RUSSELL JAMES, 7, Broadlands Road, Highgate, N.6; GEORGE LODGE, Hawkhouse, Camberley; HUGH KENNETH MUNRO, B.Sc., 258, Bourke St., Pretoria, S. Africa; JOHN GOLDING MYERS, Aranoho, Wanganui, New Zealand; ALFRED PHILPOTT, Assistant Entomologist, Biological Dept., Cawthron Inst. of Scientific Research, Nelson, New Zealand; ARTHUR WALTER RICHARDSON, 28, Avenue Road, Southall, Middlesex; Dr. WINSTAN ST. ANDREW ST. JOHN, M.R.C.S., L.R.C.P., Derwent House, Derby; Dr. JOHN W. SCHARFF, M.B., D.P.M., Tampin, Federated Malay States; Messrs. JOSEPH TINSLEY, West of Scotland Agricultural College, Burns Avenue, Kilmarnock; and WILLIAM WALLACE, M.B., 15, Hainton Avenue, Grimsby, were elected Fellows of the Society.

Exhibitions.

NEW BUTTERFLIES FROM DUTCH NEW GUINEA.—Mr. G. TALEBOT exhibited on behalf of Mr. J. J. JOICEY a number of New Butterflies from the Weyland Mountains, Dutch New Guinea.

The specimens shown formed part of the first collection made by the three brothers C., F., and J. Pratt, who were sent out by Mr. Joicey to explore a little-known part of New Guinea. The Pratts were successful in reaching the Weyland Mountains which lie about forty miles inland from the coast of Geelvink Bay.

New forms of the following species were shown: *Troides chimaera* Roths., *Papilio alberti* Oh., *Morphopsis ula* Roths., and *Morphotaenaris schonbergi* Fruh. Also a distinct species of a *Delias* belonging to the *ligata* group, a striking *Morphopsis*, a *Hypocysta*, a *Harsieris*, and a species of a new genus closely allied to *Hypochrysops*.

Specimens of *Troides joiceyi* J. and N., were shown to illustrate the transition from the typical form with black lateral abdominal sclerites, and the form without any such black scaling. These forms were taken at the same place. The *Morphotaenaris* connects *schonbergi* from Stephansort with *kenricki* from the Arfak.

The *Morphopsis* inhabits the dark forest at 5000 ft., and flies at dusk. Descriptions of these new forms will be published in due course.

LEPIDOPTERA FROM THE COOK AND SOCIETY ISLANDS; INCLUDING AN ANALYSIS OF THE MARKINGS OF THE FEMALES OF *HYPOLIMNAS BOLINA*, L.—Prof. POULTON exhibited specimens illustrating the following extracts from letters received from Mr. H. W. Simmonds of the Department of Agriculture, Suva, Fiji:—

“April 19, 1920. *Tahiti, Society Islands.*

“As to the Tahitian butterflies, *H. bolina* is most abundant, but apparently all males. There seem to be hundreds of males to one female. I say ‘seem to be’ because the two (now four) females I have taken are almost like the ♂, and, as all are worn, I may pass them by.

“Everything here is, so far as I have seen, Polynesian-New Guinea in its origin, except probably some of the Hymenoptera which seem more numerous in individuals and species than in Fiji. Possibly some of the beetles also may be New World, but I have only seen five species, and two of these are akin to New Zealand forms. There is no native bush left in valley or hill, up to 2000 ft. or more, in this district, and hardly any tracks. I hope to reach the forest before I leave, but as yet have only seen about four indigenous trees. The country is all *Lantana*. The trees are: *Metrosideros* (or very close to it), a New Zealand type; *Hibiscus*, identical with a Fijian species; two Timber trees, very close to Fijian species.”

“August 9, 1920. *Suva, Fiji.*

“I have just got back to Suva and hope to send you a few specimens by this mail from Rarotonga, Manjaia and Aitutaki in the Cook Is., and Tahiti in the Society group. I did

not see or hear of the *Euploea* in the Cook group. I saw *D. archippus* in Aitutaki only. The little blue *C. erijus* (or form) was present in all the Cooks but not in Tahiti. I did not meet *M. leda* in the Cooks, but it was present in Tahiti. The *Atella* was present in Rarotonga and Manjaia, but I did not see it elsewhere.

"The Tahitians are all wretched specimens, but I saw no decent *Euploea*s and, so far as *H. bolina* is concerned, although I saw hundreds of ♂, I only saw four or five ♀ in Tahiti, and all resembled the ♂. The form from Rarotonga is very distinct, being larger and always with the buff apex to the fore-wings, although often variable in the rest of the pattern. This is a most interesting species in the various groups of islands."

The nine *Euploea*s from Tahiti were the *walkerii*, H. H. Druce, form of *Nipara cleutho*, Quoy—a very uniform series, similar to that captured by the President in 1884. Although no *Euploea*s were to be seen in Rarotonga when Mr. Simmonds visited it, a different, more variable, and often much darker form of *N. cleutho* was taken there by Commander Walker. On the other hand Mr. Simmonds had sent eleven ♂ and seven ♀ of *Issoria (Atella) egista*, Cr., f. *boudeuxia*, Butl., from Rarotonga (May, June, 1920)—a species Commander Walker had seen but failed to catch. The commonest *Lycaenid* captured by Mr. Simmonds in the Cook Islands was *Jamides carissima*, Butl.: from Manjaia two *Zizera labradus*, Godt., were sent, also a *Macroglossa*, apparently a new form of *M. hirsuta*, Boisd.

The comparison between the females of *H. bolina*, L., from Tahiti and Rarotonga was extremely interesting. The form of female found in Tahiti and also in other islands,* although on the wing probably indistinguishable from the male, was not quite the same in pattern; for the blue fore-wing patch of the male, made up of three internervular blue spots, was replaced in the female by a white bar composed of four larger spots. Furthermore the two apical white spots in the fore-wing of both sexes was succeeded in the female, but not in

* For example, Fanning Island in the Central Pacific (Proc. Ent. Soc. Lond., 1916, p. xxv). A single individual in Mr. Simmonds' series from Rarotonga was of nearly the same male-like form.

the male, by a series of smaller spots, parallel with the hind or outer margin, and sometimes continued on to the hind-wing. Three females from Tahiti in the British Museum were also male-like, but a fourth exhibited a slight development of a brownish shade on the margins of both wings.

The five females sent by Mr. Simmonds from Rarotonga showed great variation. Their chief differences were described below, omitting the central marking of the hind-wing which was treated separately at the end.

(1) This specimen was male-like and, except for its much greater size, nearly resembled the Tahitian female.

(2) Smaller—the only one of the five which, in this respect, did not contrast with the Tahitian specimen,—darker, the white fore-wing bar overspread with scattered dark scales, the series of white spots parallel with the hind margin slightly developed, as also the orange ochreous marginal and submarginal lines in both wings, tending to invade the apical area of fore-wing.

(3) In this specimen the series of white spots, present on both wings, was more developed, as also the orange ochreous markings, especially at the apex of fore-wing.

(4) Similar, except for the still greater development and richer shade of the orange ochreous and the slightly less developed series of white spots.

(5) The white fore-wing bar overspread as in (2); the ochreous markings very pale, nearly white in the apical area. In the hind-wing the pale ochreous submarginal marking was no longer a line but a band much broader than in any other of these five females. The President, however, had captured specimens in Rarotonga with a far greater development of ochreous, recalling some of the Fiji females of *bolina*.

The relation of the central blue markings of the male hind-wing to that of the various forms of female was of much interest and strikingly illustrated by the specimens exhibited to the meeting.

The male patch was made up of blue scales, some of which becoming pink when seen at certain angles, combined with the blue to form a lilac shade. This marking usually had an

irregular white centre formed by the replacement of blue scales by white, and it was surrounded by a broad zone of darkly pigmented scales, differing from those of the general surface of the wing in that they also gave a deep blue colour by interference of light. These constituents were greatly modified in the females. In (2), (4) and (5) the only element remaining was the deep blue of the outer zone, which, invading the centre, formed a single continuous patch, evanescent in (2). In (1) and (3) the blue of the outer zone was barely visible, while the inner area, lacking the white centre, spread outwards, especially in (1), invading the area of the zone. The red scales of (1) were more abundant than in the male and therefore the lilac tint more pronounced. The patch of (3) was smaller and irregular in outline, its tint cobalt blue due to a mixture of pale and dark blue scales.

In the Tahiti female the marking was nearer to that of the male than any of the Rarotonga females, the white central scales being present and the outer zone better developed than in (1) and (3).

The relations illustrated in Mr. Simmonds' specimens of *bolina*, required to be studied in larger numbers of examples from the same and other localities, but it was hoped that the above account would be of some use as a guide. The comparisons here drawn had been greatly facilitated by Dr. Eltringham's kindly help in the rather difficult analysis of the colour effects.

EAST AFRICAN DANAINÉ BUTTERFLIES RESTING, CROWDED IN A BAMBOO CLUMP, DURING THE HOT HOURS OF THE DAY.—Prof. POULTON said that he had received only that morning a letter from one of their Fellows—Mr. C. F. M. Swynnerton, Game Warden of the Tanganyika Territory; and he wished to call the attention of the meeting to the following interesting observations recorded by the writer:—

“September 19, 1920. *Dar es Salaam*.

“Here, for some weeks, *Amauris ochlea*, Boisdu, and, in association with it but in smaller numbers, *A. niarvus*, L., subsp. *dominicanus*, Trim., have been present in (literally) enormous numbers in the public gardens. They are completely

gregarious—I never saw this at Chirinda—and spend most of their time suspended under the twigs at the base of thickets of thorny bamboos up to a few feet from the ground. One finds them there in hundreds together at any time of the day, lethargically resting. A few are usually on the wing and feeding, and all are apt to be flushed rather readily by one's close approach; but the above is nevertheless generally correct. The swarm (for there is really only one) has shifted in the course of these few weeks from a couple of large clumps of bamboos nearer the hospital to a couple of smaller clumps further north. I had thought it might all be a matter of food-plant, but search failed to reveal the latter, and I never could see laying females. To-day, however, I spotted a single long strand of the plant I was specially looking for (*Cynanchum*) winding up through one of the two original clumps of bamboo, the leaves very badly eaten. I failed to find more, though I searched carefully, and I imagine that either it has been cleared out—I notice many dry stems of climbers cut through and their roots dug out—or that the larvae have finished it.

“The reason for the gregariousness should be interesting. It may be on the lines of the gregarious habit in *Acræa* larvae—probably enhanced advertisement. It may also be that with flowers scarce—yet they are not completely scarce—or with larval food-plant absent, the butterflies are to a small extent wintering, reserving their energies and reducing wear and tear, till things improve. I would like to watch them for a whole day before really venturing suggestions, and I may yet manage this though I am very busy and must go up country again shortly. A few *Mylothris* and *Belenois* and a very occasional *Terias* and *Melanitis* are about the only other butterflies about. That birds, by the way, attack the *Amauris* in question when really hungry—as I found them to do at Chirinda—is likely, as I usually find a few of them dead on the ground, some of them with apparent birds' bill marks and probably rejected. I am afraid I have quite given up recording instances of bird attack—I had such a surfeit of it during my experiments in Rhodesia—but I have already seen quite a number of instances in this country and saw

many in Rhodesia after my return thither. I should say that I note such attacks more readily than I used to, doubtless as the result of practice.

"*Later.* Going early one morning - 6.15. I found them all on the wing, scattered and feeding. At 7.45 they were collecting under the bamboos again."

Prof. Poulton said that, so far as he was aware, this observation had never before been made in Africa. Dr. G. A. K. Marshall had observed the two E. African forms of *Hypolimnas* (*Euralia*) *dubia*, Beauv., — *wahlbergi*, Wallgr., and *mima*, Trim.—collecting together, between 3 and 4 p.m., for the nocturnal rest (Trans. Ent. Soc. Lond., 1902, pp. 491, 492), but he had never seen African butterflies congregating in shady places to avoid the sun, in the manner described by Mr. Swynnerton. Dr. Marshall had, however, found the same thing happening in Trinidad and Jamaica,—so much so, indeed, that, at the time of his visit, it was useless to attempt to catch butterflies except in the cool morning and evening hours. Dr. Longstaff's experience in many countries agreeing with that of Dr. Marshall in Africa, was summed up in the statement that "very few [butterflies] comparatively are to be seen on the move before 9 a.m., and few after 3 p.m. . . ." ("Butterfly-hunting in Many Lands," London, 1912, p. 599). Mr. N. Ammandale, too, had observed that certain Siamese insects were active during the hottest hours when birds did not hunt for food, but were rarely seen in motion or indeed to be found at all in the cooler hours when their enemies were at work (Proc. Roy. Phys. Soc., Edinb., 1900, No. XXIX, pp. 439-444).

Dr. Marshall's experience in America and Mr. Swynnerton's at Dar es Salaam were therefore the precise opposite of the other observations quoted above: in the first the butterflies were active in the cool daylight hours and rested in the heat; in the second they rested in the cool hours and were active in the heat. Extended investigations in various parts of the tropics, and especially in the same locality at different seasons, with due regard to the humidity as well as the temperature of the air, would probably explain the apparent inconsistency; and it was to be hoped that Mr.

Swynnerton would continue his interesting observations at Dar es Salaam.

THE PRESIDENT, Dr. NEAVE and Dr. MARSHALL commented on Prof. Poulton's exhibit.

ABERRATIONS OF BRENTHIS EUPHROSYNÉ AND B. SELENÉ.—

THE SECRETARY exhibited on behalf of Mr. B. G. ADAMS a magnificent collection of aberrations of *B. euphrosyne* and *B. selene*, all taken in different years in a restricted locality in N. Devon about 600 ft. above the sea. Amongst these were two specimens which appeared to be hybrids, the upper-side of one being that of *B. euphrosyne* with the underside of *B. selene*, the opposite being the case with the other specimen. The two species often overlapped.

DIPTERA FROM NORFOLK.—Mr. J. E. COLLIN exhibited the following interesting species of Diptera captured on Blakeney Point, Norfolk, from July 16-24, 1920.

Hercoctonus praeclatatus Haliday. Described in 1855 from a single male captured in July 1854 on the Sandhills of Rossbegh Point (Kerry), and never rediscovered in Britain until Dr. Winifred E. Brenchley found two females at Blakeney Point in August 1919, a discovery which led to the search for and capture of both sexes in some numbers this year.

Pipunculus minimus Becker. A species new to the British List not hitherto considered distinct from *P. littoralis* Becker.

Limnophora aestuum Villeneuve. Also new to the British List. Mr. H. W. Andrews has found this species in Ireland, and there were one or two unidentified specimens in the Verrall Collection. It was a common species among the *Psamma* growing on the sandhills at Blakeney.

Limnophora maritima v. Rüder. This name so far as the British List is concerned has been wrongly applied to the next species. The females were common on the sandy mud left exposed by the retreating tide, but only three males were captured.

Limnophora virgo Villeneuve. Only a single female of this interesting species was captured among the *Psamma* growing on the sandhills. The name is new to the "List," though previous British records of *L. maritima* apply to this species.

Limnophora biseriala Stein. A recently (1916) described

species which was fairly common on the *Psamma*-covered sandhills. It is an addition to the British List.

Tetanops myopina Fallen. A sea-coast sand-hill Ortalid not often found in collections and the only representative of the genus in Britain.

News of Russian Entomologists.

Capt. BURR said that he had been trying to obtain news of Russian Fellows of the Society and had heard definitely that M. KUZNEZOFF had succeeded in escaping to Finland. It was, however, feared that M. SEMENOFF THIAN-SHANSKI had been beaten to death by the peasants, though it was not quite certain which of the brothers had met with this fate. Other well-known entomologists had also lost their lives, and the Museums had been to a great extent destroyed.

Mr. WHEELER observed that M. AVINOFF had undoubtedly escaped, as he had seen him in the Library and had taken him home to lunch; he was now probably in Paris.

Papers.

The following papers were read:—

"Butterfly Migration in British Guiana," by L. D. CLEARE, F.E.S.

"Preliminary Note on the Interpretation of Insectan and Myriopodan Structures, through a Comparison with the Structures of Crustacea," by Prof. G. C. CRAMPTON, Ph.D., F.E.S.

Wednesday, November 17th, 1920.

Comm. J. J. WALKER, M.A., B.N., F.L.S., President, in the Chair.

In reading the minutes of the previous meeting, the

SECRETARY observed that it was now known that M. SEMENOFF THIAN-SHANSKI was still living.

Election of Fellows.

Messrs. T. H. L. GROSVENOR, Waldeanes, Redhill; EDGAR E. SYMS, 22, Woodlands Avenue, Wanstead, E. 11; and CYRIL LUCKES WITHEYCOMBE, 12, Prospect Hill, Walthamstow, were elected Fellows of the Society.

Nomination of Officers and Council.

The following Fellows were nominated by the Council as Officers and Council for the Session 1921-1922.

President: The Rt. Honble. Lord ROTHSCHILD, M.A., F.R.S., &c. *Treasurer:* W. G. SHELDON, F.Z.S. *Secretaries:* The Rev. GEORGE WHEELER, M.A., F.Z.S.; S. A. NEAVE, M.A., D.Sc., F.Z.S. *Librarian:* H. J. TURNER. *Other Members of Council:* ROBERT ADKIN; H. E. ANDREWES; G. T. BETHUNE-BAKER, F.L.S., F.Z.S.; G. C. CHAMPION, A.L.S., F.Z.S.; J. HARTLEY DURRANT; A. D. IMMS, M.A., D.Sc., F.L.S.; JAMES J. JOICEY, F.Z.S., F.L.S., etc.; G. A. K. MARSHALL, D.Sc., F.Z.S.; Capt. NORMAN D. RILEY; H. ROWLAND-BROWN, M.A.; Comm. JAMES J. WALKER, M.A., R.N., F.L.S.; Capt. the Rev. JAMES WATERSTON B.D., B.Sc.

The New House.

The TREASURER reported that the contract for 41, Queen's Gate was now signed, and announced the munificent donation of £1000 by Dr. LONGSTAFF towards the purchase.

Exhibitions.

FURTHER INSTANCES OF THE MIMETIC ASSOCIATION BETWEEN TWO EUPLOEINES AND ONE DANAINA IN FIJI.—Prof. POULTON said that he had received from Mr. H. W. Simmonds many more examples of the species tabulated in Proc. Ent. Soc., 1919, pp. lxix-lxxi. Although several other Euploeas were recorded from Fiji it was obvious from Mr. Simmonds' captures that *Nipara eleutho*, Quoy, and its mimic *Deragenia proserpina*, Butl., were the dominant forms and that next in abundance among the *Danaiinae*, was *Tirumala neptunia*, Feld., which

flew with and mimicked the far commoner *Euploea*. It was shown in the previous communication (p. lxxi) that the female *proserpina* was a better mimic of *eleutho* than the male; and the series of *neptunia* now received proved that here too the female Danaine resembled the *Euploea* more closely than the male, the suppression of the greenish markings in the central and basal parts of both wings being carried much further in most examples of the former sex than in most of the latter.

The following records showed conclusively that the two *Euploea*s fly together in different parts of Viti-Levu and on adjacent islands and that they are often accompanied by the *Tirumala*. Evidence was also now forthcoming that the model *eleutho* was at certain times and places more abundant than its mimic *proserpina*. It was also interesting to note that whereas *proserpina* was confined to Fiji, *eleutho* had an enormous range over Polynesia.

Sept. 9, 1920.—At Levuka, on Ovalau island to the E. of Viti-Levu, on the same hill and within two minutes of each other:—1 ♀ *eleutho*, 1 ♂ *proserpina*, 1 small, dark, ♂-like ♀ *H. bolina* which on the wing would probably closely resemble the *Euploea*s.

Aug. 11, 1920.—On Motoriki island, S.W. of Ovalau, 1 ♀ *eleutho*, 1 ♀ *proserpina*.

At Nasinu, Lower Rewa District, S.E. Viti-Levu. Dec. 18-19, 1919.—1 ♂ 1 ♀ *eleutho*, 8 ♂ 3 ♀ *proserpina*, 1 ♀ *neptunia*; Jan. 9, 1920.—4 ♂ *eleutho*, 4 ♂ 1 ♀ *proserpina*; Sept. 4.—1 ♂ *eleutho*.

At Suva, S.E. Viti-Levu. Apr. 7, 1919.—1 ♂ *proserpina*, in addition to the one recorded in the 1919 table; Jan. 18-19, 1920.—2 ♂ *eleutho*, 2 ♂ *proserpina*; Jan. 21.—1 ♂ *eleutho*, 2 ♀ *proserpina*; Sept. 22.—1 ♀ *eleutho*; Oct. 7.—1 ♀ *eleutho*.

At Lami, Fiji. Aug. 28, 1920.—2 ♂ 1 ♀ *neptunia* (the ♂ H.-W. scent-pockets eaten away, probably by ants); Sept. 12.—2 ♂ *proserpina*.

At Waidoi Rubber Plantation, about mid-way between Suva and Navua, S. Viti-Levu. The following additions to the 1919 table printed in Proc. Ent. Soc., 1919, p. lxx:—*eleutho*, 1—June 1: *proserpina*, 1 ♂ on each of following dates, May 20, 25, 28, June 1, 10; 2 ♂ on May 31; 1 ♀ on May 27
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and on 28: *neptunia*, 2 ♀—May 27; 1* ♂—June 5. The following captures at Waidoi, after the last date of the 1919 table, include a larger proportion of *eleutho*, although much smaller than that indicated by Mr. H. W. Sinmonds' latest observations in the Suva district.

"Suva, Sept. 23, 1920. I must decidedly modify some of my former statements with regard to the two *Euploeas*. *N. eleutho* has in the neighbourhood of Suva recently been far

Dates in 1919.	<i>Eleutho.</i>	<i>Proserpina.</i>		<i>Tirumala septentia.</i>
	♂ and ♀ alike.	♂	♀	
June 15	—	1	—	—
" 17	—	1	—	—
" 18	2	3	1*	—
" 20	—	1	1	1 ♀
" 21	2	1	1	—
" 22	1	1	—	—
" 23	1	—	1	—
July 14	3 ♂, 1*	1	3	—
" 17	1	—	—	—
" 23	1	—	1	—
Aug. 7	—	—	—	1 ♂
" 21	—	1	—	—
" 23	—	—	1	—
Oct. 4	—	—	1	—
" 12	—	—	1	—
Nov. 25	1	—	—	—
" 27	—	1	—	—
Totals	13	11	11	2

* An asterisk indicates that the label had become detached in the post, and that the date, although probable, is not certain.

commoner than *D. proserpina*, although when I got to native bush the position was immediately reversed."

NEW LEPIDOPTERA FROM THE ISLAND OF HAINAN.—Mr. G. TALBOT, on behalf of Mr. J. J. JOICEY exhibited numerous specimens of new Lepidoptera from the island of Hainan, and made the following observations :—

During the years 1918, 1919, and the present year, the Hill Museum has received large collections of Lepidoptera from Hainan. These have been obtained by and through the exertions of Mr. C. Talbot Bowring of Hoihow. This gentleman has very generously presented all the specimens to the Hill Museum on condition that a catalogue of all the species would be prepared. We propose, therefore, to publish a complete list of the Lepidoptera from this island, and this we should have resolved upon doing in any case, because the collections sent by Mr. Bowring have increased enormously our knowledge of the number of forms already known to exist upon the island.

Mr. Bowring has spared no effort and expense to obtain specimens from different parts of the island. During the spring of this year, Mr. Young Chun, a Chinese graduate of Harvard University, was in Hainan collecting plants. He made a successful expedition to the Five-Finger Mountains in the country of the Loi savages, where the explorer Whitehead lost his life. Mr. Chun very kindly handed his collection of Lepidoptera to Mr. Bowring for transmission to us.

Although something is known already of the forms inhabiting these mountains, through the efforts of Whitehead and of a Japanese collector sent there by Lord Rothschild, the collection made by Mr. Chun contains some interesting novelties, chief among which is a form of *Kallima inachis*. The collection is not yet worked out and may contain other new forms. The same must apply to a mass of Mr. Bowring's material.

The following forms are shown :—

Papilio hippodamia bowringi Prout; *P. dinis enteleucus* Roths., with the hitherto unknown female; *P. phetevor* Westw., subsp. nov.; *P. castor humela* Grly.; *P. aristodolone gonipellis* Roths., with its mimic *P. polytes* L. ♀; the aberration *astreaans* Jord. of *polytes*; *Pieris nagonum* Mre.; *Danaida sita* Koll.,

subsp. nov., with the mimetic *Hestina nama* Doubl., subsp. nov.; *Linmenitis dudu* Westw., subsp. nov.; *Kallima inachis* Bdv., subsp. nov.; *Charaxes marmax* Westw., subsp. nov.; *Eriboea nepenthes* Gr.-Sm.; *Penthema lisarda* Doubl., subsp. nov.; *Adolias dirteq pardalis* Mre., and its mimic *Euthalia whiteheadi* Crowley; *Stichophthalma nourmahal* Westw., subsp. nov.; *S. neumogeni* Leech, subsp. nov.; *S. howqua* Westw., subsp. nov.; *Elymnias patna* Westw., subsp. nov.; *Ragadia crisilda* Hew., subsp. nov.; *Coelites nothis* Bdv., subsp. nov.; *Crossiura pencillatum* Nicév., subsp. nov.

A CURIOUS COCOON.—DR. MARSHALL exhibited a curious flattened cocoon from S. Italy and the larva which had been extracted from it, which superficially resembled a Hesperid. In answer to his enquiry the Rev. F. D. MORICE stated that they were the larva and cocoon of a saw-fly nearly related to *Cimbeæ*.

MELANIC NOLIDAR.—DR. COCKAYNE exhibited a series of *Nola cucullatella*, var. *fuliginalis*, Steph., bred in June and July 1920 from Epping Forest larvae, together with type specimens from the same locality, including the seven darkest. The percentage of melanic specimens was 10%, 34 having been bred out of a total of 339. He had bred 57 specimens of the hymenopterous parasite *Meteorus fragilis*, Wesm., from this species. He also exhibited a pair of *N. confusalis* type and a pair of var. *columbaria*, Image, from the same locality to show the parallel melanic variation.

NEW LEPIDOPTERA FROM MADAGASCAR.—MONS. F. LE CERF exhibited the following specimens: (1) a new species of *Lynantria*, with flesh-coloured hind-wings washed with black and grey; (2) a pair of a new and very large species of *Dasychira*, with black and white upper- and yellow under-wings, another pair of which are in Mr. Joicey's collection; (3) a new species of *Pinacopteryx* belonging to the *simana*, Hoff., group, but quite without black markings except at the apex; and (4) a male *Hyplimnas bolina*, L., from the interior of the island, east of Mananjany, with strongly marked discoidal patches and submarginal spots.

PROBABLE HETEROMORPHISM OF SECONDARY SEXUAL CHARACTERS IN TRILOCHANA.—MONS. LE CERF also made the

following observations on a probable case of heteromorphism in *Aegeriidae* which he had discovered in Mr. Joicey's collection. The specimen in question was closely related to the genus *Trilochana*, Moore (*Scolionima* Butl.), but differed by its narrower and more oval wings, its head narrower than the prothorax, its small oval eyes, and in various details of its palpi, legs and neurulation. While he realised that apart from apterous females no case was known in the Lepidoptera of so many and such varied sexual distinctions, he still considered that it was an extreme case of the inversion of secondary sexual characters, since the females among these *Aegeriidae* possess the following characteristics: strongly pectinated antennae, broad head, large round eyes, a long cylindrical abdomen, legs and the extremity of the abdomen clothed with long hair, all of which in other *Aegeriidae* are characteristics of the males. All three species of *Trilochana* were described from females, mistakenly supposed to be males in consequence of the above-named characters, and it was logical to suppose that the hitherto unknown males would show inverse characteristics. The area of dispersion of these *Aegeriidae*, as shown by the specimens in various collections, corresponded with that of their Hymenopterous models. The (unfortunately mutilated) specimen in Mr. Joicey's collection probably belonged to a new local race of *Trilochana scolioides*, Moore, hitherto known from Sikkim and Indo-China.

The exhibitor illustrated the points he enumerated by drawings shown by the epidiroscope.

Mr. DERRANT gave other instances of males with simple and females with pectinated antennae.

Wednesday, December 1st, 1920.

COMBL J. J. WALKER, M.A., R.N., F.I.S., President, in the Chair.

Election of Fellows.

MESSRS. CHARLES EDWARD CLARKE, c/o G. Howes, Esq.,
152, George Street, Dunedin, New Zealand; EDWARD WYLLIE

FENTON, M.A., B.Sc., Seale-Hayne Agricultural College,
 Newton Abbot, Devon; Mrs. ELLA FREDERICA MELDOLA,
 of Brunswick Square, W.C.1; and Mr. DAVID MILLER, c/o
 G. Howes, Esq., 452, George Street, Dunedin, New Zealand,
 were elected Fellows of the Society.

Nomination of Officers, etc.

The names of the Officers and Council nominated by the present Council for the ensuing session were read for the second time.

Exhibitions.

RARE AND LOCAL COLEOPTERA FROM SUFFOLK. Mr. DONISTHORPE exhibited certain rare and local beetles from Suffolk:—A nice series of *Chrysomela marginata* L., taken at Freckenham in Sept. last. This rare species is a new record for Suffolk; the only southern localities previously known are Southend, Pegwell Bay, Swansea and Brighton. *Anisotoma cinnamomea* Pz., eight specimens swept at Barton Mills on Oct. 1 last, under fir trees. It was usually found under beech, and occurs in truffles, and had only previously been recorded for Suffolk by Curtis. *Anisotoma pallens* Stm., swept at Barton Mills Sept. 9, 1917. The only time it had been previously taken in Britain was in 1873, by our President, at Deal. *Dryophilus anobioides* Chev., beaten off broom in plenty at Barton Mills, May 19 last. First taken in Suffolk at Freckenham by Dr. Nicholson in 1916. Having failed to find it at Freckenham, the exhibitor went to Barton Mills, where he knew of a large patch of broom, and found it in numbers. It had only been found in Britain before at Plumstead, Coombe Wood, Chobham, and Bradfield.

A VERY RARE COLEOPTERON.—Mr. BEDWELL exhibited a specimen of *Agabus melanarius* Aubé., taken on Haldon Moor, near Teignmouth, Devon, out of sphagnum in a boggy spot, on Sept. 23 last. So far as he knew there were only two previous records for this country: a single specimen taken

in the Orkneys by Mr. Syme, now in the Power Collection, and Mr. Bold's record of a specimen from Long Benton, Northumberland, which Fowler apparently considers doubtful.

HYBRID COLIADS.—Mr. SHELDON exhibited a box of *Colias hyale* and *C. erate* from Karepta, Russia, with specimens which appeared to be hybrids between these two species and also between *C. erate* and *C. edusa*.

Mr. ROWLAND-BROWN enquired whether hybrids between *C. hyale* and *C. edusa*, which so frequently fly together, had ever been taken, but no Fellow present had ever seen one. Mr. SHELDON said that in Lapland *C. verdanis* and *C. hecla* generally occur on different ground, but that where they overlap specimens occur which appear to be hybrids. The Rev. G. WHEELER said that in the Swiss collection of the late Mr. Fison, there was a hybrid between *C. phicomane* and *C. palaeno*. Lord ROTHSCHILD remarked that he had another, and had also received two large batches of apparently hybrid Coliads; at the same time, *C. caerulea* ranges from greenish-white to orange in a district where no other orange Coliad occurs.

AN ABERRANT LYCAENID.—Mr. L. N. STANLAND exhibited a specimen, probably of *Polyommatus icarus*, in which the spots on the margins of the wings, on the underside, are lacking. The specimen was taken in company with other Common Blues, at Fleet, near Aldershot, on June 1, 1910.

Several Fellows commented on this specimen, remarking on its near resemblance to *P. eros*.

ABERRATIONS OF LEPIDOPTERA. Mr. G. T. BETHUNE-BAKER exhibited an aberration of *Melitaea didyma* with the underside of hind-wings nearly all primrose yellow with base pinkish-red; also an aberration of *Zygana ceanothica* with the fore-wings entirely suffused with red.

LOCAL SUSSEX LEPIDOPTERA.—Mr. WHEELER exhibited on behalf of Mr. F. G. BRAMWELL specimens of the local Zygaenid *Ino globulariae* and the still more local geometrid *Acidalia immorata*.

A GYNANDROMORPHOUS ANT. Mr. CRAWLEY exhibited a lateral gynandromorph of *Monomorium floridula*, Jerd., taken by the late Dr. Swale in Samoa in 1917.

LEPIDOPTERA FROM THE EASTERN CONGO.—Mr. TALBOT on behalf of Mr. JOICEY exhibited the following Lepidoptera collected by Mr. T. A. BARNES on an expedition through the region of the Eastern Congo to Ruwenzori and the Ituri. *Papilio mackinnoni* Shpe., a new race from S.E. Congo Dist.; *Mylothris ruandana* Grunb., the ♂ and hitherto unknown ♀ from the Ruanda Dist.; *Belenois solilucis* Butl., ♂ ♀, from Semliki—the ♀ represents a new colour form; *Acraea disjuncta* Gr.-Sm., typical form from Ruwenzori together with the mimetic *Neptis ochracea* Neave, taken with it; a new form with broad and continuous band on the fore-wing from the Ituri Dist.; *Acraea* sp. nov. near *leucopyga*, from Upper Congo; *Acraea* sp. nov. allied to *goetzei*, from the Kivu Dist.; *Acraea butleri* Auriv., four forms from the Kivu Dist.; *Amavriina ellioti* Butl., from the Kivu Dist.; *Euptera hirundo* Stgr., subsp. nov., from the S.E. Congo Dist., a new ♀ form; *Euphaedra eleus* Dry., subsp. nov., from S.E. Congo Dist.; *Euzanthe crossleyi* Ward., typical form (Cameroons), form transitional to *ansorgei* (Kasai Dist.), form with much enlarged stripes (Ituri Dist.), f. *ansorgei* Roths. (Uganda); *Semioptila* sp. nov., from S.E. Congo Dist.; *Dorania poecila* R. & J., a very rare Sphingid, from the Kivu Dist.; *Papilio dardanus* ♀ f. *niobe* Auriv., from Ituri; *P. dardanus* ♀ f. *trophonissa* Auriv., from the Kivu Dist.; *P. ridleyanus* Ward, and *Acraea perennu* Doubl., taken feeding together; *P. jacksoni* Shpe. ♀, and model *Anauris egialea*, subsp. nov., from Kivu Dist.; *Charaxes etheocles* ♀ f. *cedreutis* Hew., taken whilst feeding on tree gum; resembles the ♀ of *C. numenes* Hew., occurring in same region; *Planema schubotzi* Grunb., ♂ ♀, from Ituri Forest, and mimicked by *Pseudacraea eurytus* ab, *bicolor* Auriv.; *Planema macarista* Shpe., a new form with cell-spot on fore-wing, mimicked by *Pseudacraea eurytus*, f. *hobleyi* Neave, from the Ituri Forest; *P. hobleyi* shows the hind-wing band very sharply defined distally, which is not the case with Uganda specimens he had seen; *Acraea oberthuri* Butl., mimicked by *Mimacraea landbecki* Druce, from Upper Congo and Ituri Dist.; *Acraea urui* Gr.-Sm. ♀, mimicked by *Vanesula milca* Hew., from Ruwenzori, found flying together; *Acraea bonasia* Fbr., mimicked by 2 *Teliassa* sp. ? from Upper

Congo; *Pentila hiemlemayeri* Dew., mimicked by *Mimaletis reducta* Prout, from Upper Congo and Semliki; *Porellana cottoni* B.-Bkr., taken on an oil palm in company with an *Epitola* sp. ?; the *Porellana* is conspicuous on the wing but nearly invisible when it rests with wings folded; Upper Congo; *Charaxes kahldenii* Dew., with its form *ehmeckeii* Dew., taken feeding together, Ituri River; *Melinoessa (Rhamidara)* sp. nov. (Geometrid), mimicked by *Larinopoda emilia* Suff., from Upper Congo; *Neptis ochracea* Neave, taken together with *Acræa disjuncta* Gr.-Sm., which it very closely resembles in flight and colour, in thick forest bordering long grass. A scarce species, not more than one being usually seen at a time; *Papilio dardanus* ♀ f. *niobe* Auriv., very heavy of flight and easily caught, it resembles a large *Acræa* when flying; inconspicuous when at rest and resembles a brown leaf; *Vanessula milea*, often found flying with *Acræa ucai* Gr.-Sm., for which it may be mistaken both in flight and colouring; *Telipna* sp. ? near *semitrifa* Kirby, found flying with *Acræa bonasia* Flr., for which it may be mistaken; at the same place was also accompanied by another *Telipna* sp. ? with broader bands; *Porellana cottoni* B.-Bkr., found in more open part of forest on oil-palm; conspicuous on the wing, but almost invisible at rest with wings folded; taken on the same tree with *Epitola* sp. ?; *Charaxes kahldenii* Dew., taken with the form *ehmeckeii* Dew., feeding on dung; *Euxanthe crossleyi*, which has habits similar to the Liptonids, flies high and fond of resting on dry twigs at right angles to stem, or occasionally on the bark of a tree; *Papilio dardanus trophonissa*, not known from L. Kivu; *Papilio dardanus niobe*, not known from Ituri Dist. No *Planema* f. taken in this Dist.; *Papilio jacksoni*, not known south of Ruwenzori; *Pseudacraea eurytus*, f. *hobleyi*, not known from Ituri Region before; *Papilio mackinnoni*, not known before from S.E. Congo, but recorded from Kivu; *Acræa disjuncta*, not known from the Ituri; *Acræa butleri*, the only form of *johnstoni* found in Kivu Dist. *Amaurina elliotti*, hitherto only known from Ruwenzori; *Harpodyscus reginaldi*, only known from Ruwenzori; *Dovania pocilla*, only known from one ♂ type, Central Angoniland,

LAMELLICORN BEETLES FROM TONKIN.—Mr. G. J. ARROW exhibited males and females of three species of Lamellicorn beetles (*Ectinohoplia*) from Tonkin to show a hitherto unrecorded difference between the sexes. The females were remarkable for the clothing of beautiful golden scales upon the pygidium and lower surface of the body, replaced in the males by quite dull scales. Remarking that it was very unusual to find females of any insect more brilliantly adorned than the males, Mr. Arrow called attention to the fact that in the present instances the golden scales were found only upon a part of the body where they were concealed in the ordinary position. Of one of the three species (*E. suturalis*) only one sex has so far been described, while the other two are new.

BOREUS HYEMALIS, FEMALE, AND EGGS.—Mr. WITHEYCOMBE exhibited specimens of this insect from Epping Forest, first seen on Nov. 13, in company with a small Carabid beetle, *Notiophilus palustris*, which somewhat resembles it at first sight.

A BRED ORNITHOPTERON FROM SELANGOR WITH PRECISE PUPA-CASES.—Prof. POULTON exhibited three (out of five) males and three females of *Troides helena cerbera*, Feld., bred, July to September, 1920, by Mr. W. A. Lamborn, from larvae or pupae found at Ulu Gombak, thirteen miles from Kuala Lumpur, F.M.S. One female larva pupated July 11 and emerged about 8.0 a.m. on July 18—a very short pupal period for so large an insect. One male was found hanging to its pupa-case in the forest at 9.0 a.m. on July 18. Each of the six butterflies was accompanied by its pupa-case, one of each sex being mounted so as to show respectively the external characters of a female pupa on the 8th abdominal segment, and of a male on the 9th. The sexual differences could be detected by the naked eye.

THE FLIGHT OF CERTAIN PAPILIONIDAE SOMETIMES MAINTAINED BY THE FOREWINGS ALONE.—Prof. POULTON said that Dr. H. F. Standing had written to him as follows on the flight of *Papilio* (*Pharmacophagus*) *antenor*, Drury :—"On the wing it looks like a bird, the hind wings seeming to take little part in the flight and looking like the body of a bird." The obser-

vations were made, 1917-1918, at Maintirano, near the middle of the W. coast of Madagascar. Similar observations on *Troides amphrysus flavicollis*, Druce, had been recorded in greater detail by S. B. J. Skertchly in Ann. Mag. N.H., Ser. 6, vol. IV, 1889, p. 218:—"The male in basking along the foliage on sunny river-sides [in British North Borneo] often flies slowly along, moving only its fore wings, the hind wings drooping at an obtuse angle to the line of flight, trailing like a rich robe of golden silk. . . . In such flight the fore wings only move through a small angle." Speaking of the hair-fringed inner marginal fold (found in males of the *Aristolochia* or *Pharnacophagus* Swallowtails) Skertchly wrote of the same *Troides* (l. c.):—"In normal flight and when at rest this pouch is closed, but when the hind wing is drooped the pouch opens. It may therefore be a scent-pouch and this peculiar flight the normal courting flight."

Mr. E. E. GREEN said that he had frequently noticed the curiously laboured flight of *Troides darsius*, Gray, in Ceylon; but had never formed any theory to account for it. Prof. Poulton's remarks now afforded a perfect explanation of the peculiarity. Mr. Green had noticed the flight more particularly when the male was courting a female. On one occasion, while riding his bicycle along the main drive of the Peradeniya Gardens, he came upon a courting couple hovering at about the height of his head. As he passed, he put up his hand and actually caught the male, by the under part of the thorax, between his finger and thumb!

Mr. T. H. L. GROSVENOR said that in the common *Papilio* (*Laertias*) *polytes*, L., it was quite a usual occurrence for the males to carry the secondaries apparently motionless, especially during feeding when flying from flower to flower; also, when settled on a bloom, it would let these wings droop, as if they were quite useless, or broken, at the same time slowly opening and shutting the primaries. Such movements and attitudes were not seen in any other species, nor were they witnessed in the female of *polytes*, which are more retiring than the males, or in the males themselves when flying in the open and round muddy pools. Mr. Grosvenor's observations were confirmed by Mr. JOY.

Papers.

The following papers were read :—

“ A Description of the Female of *Chastopsylla godfreyi*, Waterst., with further notes on the Genus,” by Capt. the Rev. J. Waterston, B.D., B.Sc.

“ On a New African Fig-insect, *Blastophaga dyscritus*, n. sp.,” by the same.

ANNUAL MEETING.

Wednesday, January 19th, 1921.

Commander JAMES J. WALKER, M.A., B.N., F.R.S., President,
in the Chair.

The Rev. G. WHEELER, one of the Secretaries, read the
following

Report of the Council.

The Session now concluding has been one of various and important changes, which have, however, left the Society in a very satisfactory position. Although we have had an unusual number of losses, 37 in all, occasioned by the death of 13 Fellows, the resignation of 19, and the removal of 5 for non-payment of subscriptions, yet these losses have been far more than counterbalanced by the unprecedented number of those who have this year joined our ranks, no less than 72 Fellows having been elected during the year 1920. The Society now consists, so far as can be ascertained, of 12 Honorary, 2 Special Life Fellows, and 656 Ordinary Fellows making a total of 670. It is still, however, unfortunately, uncertain whether the Hon. Fellow A. P. SEMENOFF THIAN-SHANSKI has been assassinated in Russia.

The vacancy in the Trusteeship caused by the death of Lord WALSHINGHAM has been filled by the appointment of Prof. POULTON.

Owing to the greatly increased and continually increasing cost of publication, the Transactions of the Society are again of smaller proportions than in recent years; they consist, however, of 118 pages, and contain 18 papers by the following authors :-

G. J. ARROW, F.Z.S.; Surgeon-Commander MALCOLM CAMERON, M.B., R.N. (2); G. D. H. CARPENTER, M.B.E., D.M., etc.; T. A. CHAPMAN, M.D., F.R.S., etc. (2); L. D. CLEARE; J. E. COLLIN, F.Z.S.; G. C. CRAMPTON, Ph.D. (2);

F. A. DIXEY, M.A., M.D., F.R.S., etc.; H. SCOTT, M.A., D.Sc.; G. TALBOT; H. J. TURNER; Capt. the Rev. J. WATERSTON, B.D., B.Sc. (3); and C. B. WILLIAMS, M.A. Of these 4 refer entirely to Lepidoptera, 3 to Coleoptera, 2 to Hymenoptera, one each to Diptera, Isoptera and Orthoptera, and the rest are of Biological interest. They are illustrated by 4 coloured, 2 half-tones and 5 line-block plates, 2 maps, and several text-figures. The cost of one coloured plate is borne by Dr. CHAPMAN, and that of 4 line-block plates and the text-figures by Mr. COLLIN; the originals have in all cases been given by the authors, and Dr. CARPENTER contributed £10 towards the cost of his two coloured plates. In addition Mr. JOICEY paid half the cost of Mr. Talbot's paper and a donation of £50 was received from Jesus College, Oxford, towards the cost of the Society's publications.

The Proceedings will consist of about 90 pages and are illustrated by 4 black and white plates the cost of which is borne by Lord ROTHSCHILD.

The great increase in the expenses of the Society, caused principally by the ever-increasing cost of publication, has rendered necessary an increase in the Entrance Fees and Subscriptions, the abolition of composition for Life Fellowship, and other changes. This necessity and various details principally connected with the removal of the Society to new quarters have brought about many changes in the bye-laws, which received somewhat drastic revision at a Special Meeting held for that purpose on May 5th.

The Housing Sub-Committee has issued the following Report, to which it is only necessary to add that Mr. ROBERT ADKIN, Dr. G. A. K. MARSHALL and Mr. W. G. F. NELSON have been appointed Trustees for the Debenture Holders.

Report of the Housing Sub-Committee.

In view of the practical completion of their task, the Housing Sub-Committee feel that this is a suitable occasion on which to record the steps that have led to 41, Queen's Gate, South Kensington, being acquired as the permanent home of the Society.

The Sub-Committee, consisting of the Honble. N. C. ROTHSCHILD (Chairman), Mr. W. G. SHELTON and Dr. S. A. NEAVE, was originally appointed by the Council to consider the whole question of new quarters for the Society, and in the first place, to endeavour to obtain free accommodation from the Government at Burlington House or elsewhere.

After consideration it was decided to approach the First Commissioner of Works through the Royal Society, this body, according to an entry in the Council Minute-book of our Society, dated so far back as 1856, having promised that they "would watch the interests of the non-accommodated societies in the event of the Government providing further accommodation."

The Secretary of the Royal Society, Mr. W. B. Hardy, was extremely helpful, and personally interviewed the First Commissioner on our behalf. Whilst sympathetic with the idea, the Commissioner explained that he had no authority to grant accommodation to a learned Society in any other building than Burlington House, which was already full, and that in view of the present financial position the probability of any departure from this policy being approved by the Treasury for many years was extremely remote. He suggested, however, that there was a remote possibility of some accommodation becoming available in the offices of the Civil Service Commission at Old Burlington House. On further inquiry by the Sub-Committee it was found that this prospect was so extremely uncertain as not to merit further consideration.

In the face of this position the Sub-Committee considered that as the Society could not continue to occupy its present very inadequate accommodation without becoming absolutely moribund, there were two courses open to it : --

1. To rent larger premises.
2. To purchase a Building, which should be freehold if possible, and to adapt it to suit the requirements of the Society so that it might become possessed of a permanent home.

With respect to the first of these alternatives, the Sub-Committee were unable to find any suitable accommodation, and it was felt that even if it was obtainable, it would not provide a permanent solution of the Society's difficulties, and

in view of its growth and prospects, the present congestion would almost certainly recur in a few years.

The second alternative seemed the only satisfactory method of dealing with the question, and the Sub-Committee, with the Council's consent and approval, proceeded to develop it.

The principal difficulty that confronts all such bodies as ours from time to time is their tendency to outgrow their accommodation, especially as regards their libraries. It therefore seemed desirable to acquire premises with much larger accommodation than present requirements demanded, and with a room sufficiently large to be used as a meeting-room, or alternatively, space on which to erect one. It was realised that whilst the cost of erecting new buildings at present is prohibitive, there were a certain number of large, roomy old-fashioned houses, which not being suitable any longer for their original purpose, could be acquired on reasonable terms. It was thought that if such a house could be purchased, the surplus accommodation could be let until required by the Society to other similar bodies, several of whom were without rooms.

It was considered that for the sum of £10,000 one of these old houses could be acquired and adapted for the Society's purpose.

At this juncture the Society received an offer from the Imperial Bureau of Entomology to the effect that, provided the site selected was near the British Museum (Natural History) at South Kensington, they were willing to lease the portions of the building not required by the Society.

In view of the advantages to the Science of Entomology that obviously would accrue by having the two bodies under the same roof, the Council could only consider the offer favourably, and the Sub-Committee proceeded to search for suitable premises in the required position. The task was a difficult one, for the requirements of the Imperial Bureau made it incumbent that the premises should be within the very limited area of practically three roads, *i. e.* Cromwell Road, Queen's Gate and Prince's Gate, and within this area the great majority of the houses that were for sale were too small, were not freehold, or were unsuitable in some other way, and of the few

that were suitable, some were too expensive and others restricted to private occupation only.

After a very long and persistent search and after having twice found a suitable house which at the last moment it was not found possible to secure, No. 41 Queen's Gate was purchased. This house, which will be the future home of the Society, is freehold. It is extremely well built, and contains twenty-three rooms, almost all of which are large. It includes on the first floor a room capable of seating 150 persons, which will be suitable for a meeting-room for a number of years. On the ground-floor there is ample space for the library, and there is also a Council-room which can be used as a Club-room when not required for Council or Committee meetings. On the upper floors, and in the basement, there is adequate accommodation for the Imperial Bureau. At the rear of the premises there is a space at present occupied by kitchens and a garage; this comprises a sufficient area on which it is possible to erect at any time a meeting-room much larger than that which will be used in the immediate future, and as the walls of the present buildings are up to the level that will be required for the new room it could be very economically formed, and difficulties with respect to ancient lights are not likely to arise. In the meantime the garage should be let for a considerable rental, which will substantially assist the finances of the Society.

The purchase price of these premises was £6250, and in view of the facts of their suitability, that they probably cost almost double this sum to erect, and that 25 years ago they were mortgaged for £10,000, and therefore presumably were considered worth £15,000, the purchase cannot be considered anything but a most advantageous one for the Society.

They do not require structural alterations to fit them for the use of the Society and the Imperial Bureau. They have been re-decorated throughout, and some minor sanitary alterations have been made. The Imperial Bureau have moved in, and the Library has been removed from Chandos Street and is now being re-arranged. A Caretaker and a Sub-Librarian have been appointed, and as soon as the necessary furniture has been purchased, the Society can hold its meetings in the new home.

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The cost of practically the whole of the items of expenditure which the Society has had to incur in purchasing and fitting up the new home being now known, the Sub-Committee can confidently say that the estimated cost of the scheme, *i.e.* £10,000, will certainly not be exceeded, and there is a probability of the total required being less than this sum.

The Sub-Committee deeply regret that owing to ill-health they have been deprived of the valued co-operation of their Chairman, the Honble. N. C. ROTHSCHILD, during the greater portion of the time in which their work has been carried out. They have co-opted Messrs. E. C. BEDWELL, G. BETHELL and W. G. F. NELSON, who have rendered very valuable service, and to whom the thanks of the Society are due.

The LIBRARIAN reports :—

That 398 Volumes have been issued for Home reading as against 357 Volumes last year. The Library has also been largely used for the purpose of reference.

Thirty-five Volumes and a large quantity of Separata have been added to the Library, mainly by presentations. Among the purchases the acquisition of Seitz's "Macrolepidoptera of the World," and Culot's "Noctuelles et Géomètres d'Europe" are worthy of note.

The Report was adopted on the motion of Mr. H. J. TURNER, seconded by Mr. STANLEY EDWARDS.

The Treasurer's Report.

The TREASURER then read the following Report :—

The year 1920 will always be memorable in the annals of the Society by reason that after at least seventy years of almost constant effort, it has at last succeeded in permanently solving the vital question of providing adequate housing accommodation. This question is dealt with in the report of the Housing Sub-Committee, and it is only necessary for me here to touch upon one or two aspects of the finance involved.

Of the sum, £10,000, asked for by the Council to finance the scheme, £8514 18s. 6*d.*, including £3404 18s. 6*d.* donations, was promised up to December 31st last, and of this amount £7825 18s. 6*d.* had been received.

When every one of the Contributors has loyally and generously done his or her best to assist the Society it is difficult to particularise, but I feel that reference should be made to splendid outstanding donations of £1000 from Dr. G. B. Longstaff, and £500 from the Honble. N. Charles Rothschild.

Whilst the result is so far extremely satisfactory it will be seen that there is a considerable sum not at the moment in sight, and the President has recently issued an appeal to those Fellows who have not yet contributed to do so as soon as possible. The Appeal expresses a hope that the donation fund will eventually reach £5000, and explains that if this figure is arrived at the financial position of the Society will be assured.

I sincerely trust this appeal, which has my entire support, will have the desired effect, and in view of the fact that so far only 91 Fellows, or about 14 per cent. of the entire number, have come to the assistance of the Society, I have no doubt but that it will, when the whole of the contributions have been received.

I feel sure every one will realise that the important benefit that will accrue, not only to the Society, but to the Science of Entomology, will determine *all* the Fellows to whom a contribution will not be a real hardship to themselves or those dependent upon them, to see it through. I would like to point out that *all* contributions, however small, will be gratefully received.

The Society has very reluctantly been compelled by the greatly increased cost of everything to raise the Annual Subscription to £2 2s. 6d. for the future, but in doing so it was felt that an exception should be made in favour of any present Fellow to whom the increase would be a serious hardship, and that these should have the option of continuing to pay the old subscription of £1 1s. 6d. per annum: this subscription, however, does not entitle them to receive the Transactions. It was necessary that the names of any Fellows who felt obliged to avail themselves of this offer should be known at the earliest possible moment, in order that the numbers of copies of the Transactions that would be required for the year 1921 could be ascertained, and for this reason they were asked by the President in a letter sent to all the Fellows with a copy

of the revised Bye-Laws, to communicate to me their intention by October 31st last.

In view of the fact that the old subscriptions do not now cover the Society's Establishment charges, it is a matter of sincere congratulation that extremely few of the Fellows have been compelled to avail themselves of this concession.

The Council feel that the Fellows as a body have splendidly come to the assistance of the Society in this very important respect, and they desire to express the gratitude they feel for the help so generously rendered.

The Admission Fee has been increased to £3 3s. 0d., and it will in future apply to all Fellows elected into the Society, whether residing in the United Kingdom or elsewhere.

Compounding for the Subscriptions has been abandoned; in this respect the Society follows the lead of other Societies including that of The Linnean Society which has recently abolished compounding.

Some of the Fellows who have compounded for their subscription expressed their desire to share in the burden which had been placed upon the Society by the increase of its expenses, and an appeal was sent by the President in June last, with the result that the following Fellows volunteered to assist the Society, either by paying an extra Compounding Fee of £10 10s. 0d., or by making an annual payment of £1 1s. 0d. per annum: Sir J. T. D. Llewellyn, the Rev. F. D. Morice, and Messrs. C. H. Andrewes, H. E. Andrewes, G. J. Arrow, C. T. Bowring, P. A. Buxton, C. Cave, W. H. B. Fletcher, E. E. Green, K. Jordan, W. J. Kaye, J. Spedan Lewis, H. Main, J. C. Moulton, B. S. Ogle, M. A. Phillips, W. D. Robinson Douglas, P. N. Whitley, and R. S. Wilson. The Council desires to express its sincere thanks to those Fellows for the help they have given to the Society.

The Compounding question, by these donations and the allotment of half the Admission Fees, is placed in a considerably better position, for the income arising out of the Compounding Fund will next year equal about 16s. per Compounding Fellow, instead of 10s. 5d. a year ago.

From the point of view of the usual items of income and expenditure which are dealt with in the financial statement,

the position of the Society may be considered to be quite satisfactory.

The amount received from the current year's subscriptions is again a record, 545 subscriptions having been received as against 488 in 1919, an increase of 57. The amount of subscriptions in arrears has again decreased from £84 3s. 0d. due from 47 subscribers to £57 6s. 0d. due from 42 subscribers. Admission Fees amount to £35 14s. 0d. more than in 1919. The result of the sale of Proceedings is an increase of £27 2s. 3d. on that of the previous year. The donations in aid of the Publications are in excess of those of 1919 by £122 0s. 9d., for which the donations mentioned in the Council's Report are chiefly responsible. The gratitude of the Society is due to these generous donors.

The total income, chiefly owing to the above-mentioned items, shows the large increase of £321 16s. 9d.

About two years ago the General body of Fellows assembled at an ordinary meeting passed a resolution asking the Council to provide Tea after the meetings without any cost to the Fellows. It was felt by the Council that this should be done when circumstances permitted, and as the Society is now in possession of its own home it seems a fit and proper time in which to commence to offer this hospitality to the Fellows and guests. The tea fund will therefore disappear in future.

The payments side of the balance sheet shows a large increase, which includes for salaries £15 16s. 6d. Several valuable books which the Library urgently required have been purchased out of the Library Fund, the cost of new Books has increased by £33 6s. 11d. Binding and Repairs to the Books have cost £35 14s. 10d. more than in 1919. I fear the present state of the Library will necessitate a considerable sum being spent upon repairs in the near future. The cost of Printing is over £200 less, but this is accounted for by the publications issued in 1920 consisting of matter concerning that year only, whereas a considerable portion of the publications which should have appeared in 1918 were issued in 1919 as well as the whole of the publications of the later year. Sundry printing, stationery and postage are accountable for considerable increase.

I regret that the Society's Printers have increased the cost

of its publications again within the last year by nearly 30 per cent. This question must receive the serious and careful consideration of the Council during the coming year.

The large stock of Publications which has been for several years at the Natural History Museum, has hitherto stood in a heap in one of the semi-public passages in the basement. It was impossible from this to select any volumes required, or to know what the heap actually contained. Through the intervention of Mr. J. H. Durrant the authorities of the Museum very kindly offered the Society a much more suitable position in which to store this valuable property. Racks were made and the Publications were placed in such a position and in such order that any particular volumes are always accessible. The cost of this operation was £15 18s. 4d.

The balance at the end of 1919 of £207 3s. 0d. standing to the credit of the General Account, has been during the year transferred to the Housing Fund. In consequence of this, and of certain unforeseen expenses which had to be incurred towards the close of the year, there is a small deficit in the General Account of £1 0s. 8d. On the other hand there are satisfactory balances of £206 7s. 0d. in favour of the Compounding Fund which will be invested at once, and £51 5s. 1d. in favour of the Library Fund (New Books).

I regret to report that in consequence of the general depreciation of stocks, there has been a further fall during the year in the Society's holdings in Consols and Birmingham 3 per cent. of £98 1s. 7d.

I should like here to say something of the future financial prospects of the Society, but there are certain factors which are not yet sufficiently developed to enable me definitely to do so; so far, however, as I can see from present indications, and providing certain sources of income and capital materialise as they should reasonably be expected to do from information I possess, I have no hesitation in saying that the Society is in sight of the end of its very serious difficulties, and I trust that in its new home it will develop to standards of prosperity, progress, and usefulness far higher than it has risen to hitherto. I hope to refer to this question again a year hence.

The TREASURER also read the Financial Statement, and

both Report and Accounts were adopted on the motion of Mr. BEDWELL, seconded by Mr. A. E. TONGE.

The PRESIDENT declared the Fellows nominated by the Council as Officers and Council for the ensuing Session to be duly appointed in accordance with the Bye-laws.

The PRESIDENT then read an Address, after which a Vote of Thanks to him was passed on the motion of Lord ROTHSCHILD, seconded by Mr. ELWES, to which he replied.

A vote of thanks to the Officers was then proposed by Mr. A. H. JONES, special mention being made of the retiring Librarian Mr. G. C. CHAMPION; this was seconded by Dr. COCKAYNE and passed, the Treasurer and the two Secretaries replying.

RECEIPTS.			PAYMENTS.		
	£	s. d.		£	s. d.
To Cash at Bank per last Account—			By Rent ... ..	...	...
General Account	497	3 0	" Salaries ... ..	...	...
Westwood Bequest Fund Account	65	5 8	" Library ... ..	...	...
Compounding Fund Account	57	5 8	" Books ... ..	...	...
Library Fund Account	38	7 6	" Binding, Repairs and Insurance ... ..	...	...
Tea Fund Account	3	1 0		...	...
			Cost of Publications—		
Interest on Investments—			" Printing ... ..	...	...
Dividend on Consols	31	6 3	General ... ..	...	...
Dividend on War Loan	5	15 7	Illustrations—		
Interest on Deposit	23	11 2	Westwood Bequest ... ..	...	...
Interest on Birmingham 3 % Stock			Distribution ... ..	...	...
(Westwood Bequest)	7	3 8		...	...
			" Sundry Printing and Stationery ... ..	...	...
Admission Fees			" Postage ... ..	...	...
" Annual Contributions—			" Audit Fee ... ..	...	...
1920	534	9 0	" Purchase of £90 3s. 6d. 5 % National	...	...
Arrears	31	10 0	" War Bonds—Cost ... ..	...	...
In Advance	35	11 0	" Miscellaneous Payments ... ..	...	...
			" Re-arranging Stacks ... ..	...	...
(Subscriptions in respect of year 1920			" National History Museum ... ..	...	...
received in 1919, £32 11s.)			" Transactions at ... ..	...	...
" General	148	12 0	" Donation to the Godman Monument ...	...	...
" Sales of Publications	152	9 8	" Tea and Light Refreshments—		
" Donations in aid of Publications	129	3 6	" Tea Fund ... ..	...	...
" Contributions to Tea Fund	5	2 6	General Fund ... ..	...	...
" Miscellaneous Receipts	7,880	11 10		...	...
" Housing Fund Receipts	6,257	6 3	Transfer to Housing Fund ... ..	...	...
Less Payments	1,023	5 7	" Cash at Bankers' on Deposit and	...	...
			General Account ... ..	...	...
			" On Compounding Fund Account ... ..	...	...
			" On Library Fund Account ... ..	...	...
			" On Housing Fund Account ... ..	...	...
			
				£3,526	16 5

W. G. SHERIDON, Treasurer.

WESTWOOD BEQUEST FUND.

	£	s.	d.	£	s.	d.		
To Balance at Bank, January 1, 1920	...	65	3	6	...	72	7	4
" Interest on Birmingham 5% Stock (£230 12s. 4d.)	...	7	3	8	...	...	...	...
By Expenditure on Illustrations	...	...	...	...	...	...	...	...
	£72	7	4		£72	7	4	

COMPOUNDING FUND.

	£	s.	d.	£	s.	d.	
To Balance at Bank, January 1, 1920	...	87	3	0	...	...
" One-half of Admission Fees received in 1920	...	57	15	0	...	...
" Compositions received in 1920	...	148	12	0	...	...
	£293	10	0		£293	10	0
By Investment in £90 3s. 6d. 5% National War Bonds 1928 (3rd Series)—Cost
" Cash at Bank, December 31, 1920

LIBRARY FUND (NEW BOOKS).

	£	s.	d.	£	s.	d.	
To Balance at Bank, January 1, 1920	...	33	7	6	...	...
" One-half of Admission Fees received in 1920	...	57	15	0	...	...
	£91	2	6		£91	2	6
By Expenditure on New Books	...	...	...	...	...	...	...
" Cash at Bank, December 31, 1920	...	...	...	...	...	...	...

TEA FUND.

	£	s.	d.	£	s.	d.	
To Balance at Bank, January 1, 1920	...	3	1	0	...	...
" Contributions received during year	...	5	2	6	...	...
	£8	3	6		£8	3	6
By Currier's Account

HOUSING FUND.

	£	s.	d.	£	s.	d.
To Transfer from General Fund	...	207	3	0	...	...
" Subscriptions and Donations	...	27	9	5	6	...
" Bank Interest	...	54	3	4	...	...
" Issue of Delinquent Bonds—Carry over Interest at 5%	...	...	...	...	...	...
per annum from November 1, 1920	...	4	8	0	0	...
On Current Account	...	...	...	...	...	...
	£780	11	10		£780	11 10

By cost of Purchase of Freehold Premises—11 Queen's	...	...	...	...	...	...
Gate	...	...	...	...	...	...
Country Expenses	...	...	...	...	...	...
On Deposit	...	...	...	£494	0	0
On Current Account	...	...	...	723	5	7
				1,023	5	7

W. G. SHELTON, Treasurer.

MEMORANDUM

AS TO ASSETS AND LIABILITIES AT DECEMBER 31, 1920.

ASSETS.		LIABILITIES.	
	£ s. d.		£ s. d.
To Arises—		By	
Annual Contributions ... £27 6 0		Cost of Printing Transactions Parts 111—V, 1920; Cost of Plates and Sundry Unpaid Accounts	317 5 0
Admission Fees 0 6 0		5 % Debentures issued to provide for purchase of Premises—41 Queen's Gate 4s 40 0 0	
Contributions to Publications 22 9 1		Interest thereon at 5 % per annum from November 1 to December 31, 1920	19 6 8
Income Tax Deducted in Error 2 10 9	98 11 10		
<i>Less not considered good</i>	33 12 0		
	64 19 10		4,859 6 8
Present value of—			
“ £1,354 2s. 2d. Consols 2½ % at 45 (Cost £1,233 3s.), Compounding Fund	609 8 0		
£239 12s. 4d. Birmingham Corporation 3 % Stock at 49 (Cost £250), West-End Finance	117 8 1		
£137 4s. 6d. 5 % National War Bonds 1928 (3rd Series) at 93 (Cost £134 8s.) Compounding Fund	127 12 0		
“ Freehold Premises—41 Queen's Gate—Cost of Purchase	6,250 0 0		
“ Cash at Bank—			
“ On Deposit 1,300 0 0			
“ On Current Account 897 2 0	2,197 2 0		

W. G. SHILDON, *Treasurer*.

THE PRESIDENT'S ADDRESS

LADIES AND GENTLEMEN,

The session which terminates with this evening's Meeting has undoubtedly been one of the most eventful in the whole history of the Society. In the first place, mainly owing to the generous response of a large body of our Fellows to the appeal for the funds necessary to carry out the undertaking, and to the energetic efforts of our indefatigable Treasurer, we have at last been able to secure as our own property a home which we trust will be worthy of the traditions and dignity of the most influential association of Entomologists in existence. Our new home will be shared with us, for some years in any case, by the Imperial Bureau of Entomology, and thus its importance and utility as the head-quarters of our Science in the British Empire will be enhanced in no small measure. Moreover, our new and ample accommodation will enable the treasures of our Library to be displayed to far greater advantage, and to be rendered much more accessible and available to our Fellows, than they have been for so many years in the cramped and congested space they have of necessity occupied. We deeply regret, however, that the valuable services of Mr. G. C. Champion, our Honorary Librarian for the last thirty years, are no longer available to us. During the long period in which he has held this office, his unflinching attention to its arduous and responsible duties, and the conspicuous ability with which these duties have been performed, have earned for him the unfeigned gratitude of the Society as a body; and it must not be forgotten that to him we owe the first printed catalogue of our great collection of Entomological works, as well as its

"Supplement," issued a few years afterwards. In our new Honorary Librarian, Mr. H. J. Turner, I am convinced that we shall find a worthy successor to Mr. Champion in this important office.

The acquisition of our new premises has not been free from difficulties, legal and otherwise; and we are greatly indebted to our Fellow, Mr. W. G. F. Nelson, for his most kind and valuable advice and assistance in enabling us to surmount these obstacles. The preparations for the occupation of our new home proceed apace, and we assemble this evening for almost, if not quite, the last time in the room in which, ever since the year 1874, our meetings have been held. It is only fitting here to acknowledge the cordial relations that have subsisted between the Medical Society of London and ourselves, during the long period of our tenancy of their rooms.

In common with all other scientific Societies, we have felt severely the pinch of the present hard times, and it has been found imperatively necessary to increase our Entrance Fee and Annual Subscription very materially. This increase, however, has not prevented the addition to our ranks of an unprecedented number of new Fellows, and our losses by resignation and by death have been more than made good. The cost of paper, of printing, and especially of every form of illustration, instead of becoming less as we hoped last year, continues ever to increase, and is now almost prohibitive; our Transactions have in consequence suffered somewhat, and though the quality of their contents remains as high as ever, they are smaller in bulk than has been the case for many years past, and it has been necessary to defer the publication of several important papers.

During the past year we have lost by death thirteen of our colleagues, including our senior Fellow, the Rev. Henry S. Gorham, who joined the Society as long ago as 1855. He possessed an intimate knowledge of British and exotic Coleoptera, and his Entomological writings, all of which deal with this Order of Insects, extend over a period of forty years. Among these the most important are the "*Endomycei Recitati*," published in 1873, and his contributions to the "*Biologia Centrali-Americana*," in which great work he was

responsible for the *Malacodermata*, *Erotylidae*, *Endomychidae* and *Coccinellidae*. Another veteran who has gone from among us, although he was rarely seen at our meetings, is Mr. Alfred E. Hudd of Bristol, an accomplished antiquarian as well as Entomologist, whose election to the Society dates from 1865. By the untimely death of Mr. Frank Milburn Howlett the Society has been deprived of an Entomologist of great acquirements and even greater promise, especially in the biological and physiological aspects of our Science; and the same may be said of the late Dr. Charles Gordon Hewitt, the Dominion Entomologist of Canada, whose work was on closely similar lines. Another serious loss is that of Prof. Leonard Doncaster, F.R.S., whose researches in the field of genetics mark an era in biological science; and in particular his discovery in 1906 of the phenomena of sex-determination in *Abraxas grossulariata*, as the result of an elaborate series of breeding experiments, is of the greatest interest to Mendelians. The death within the last few days of Dr. H. H. Corbett and Mr. J. W. Carter deprives Yorkshire of two of its most prominent Entomological workers; two well-known Dipterists have passed away in the Marchese Piero Bargagli and Mr. Frederick C. Adams; and Australia has lost her premier Arachnologist in Mr. William J. Rainbow, the Entomologist to the Australian Museum, Sydney, whose death took place in November 1913. To these may be added the names of Commander the Hon. Richard O'B. Bridgeman, R.N., F. M. Campbell, and James T. McDougall, respecting whom, however, I have no particulars; nor must we omit the names of Frederick Herschel Waterhouse, the last survivor of a family of distinguished Entomologists, and of William West, known to most of us as a frequent visitor and exhibitor at our meetings for many years past, although neither was a Fellow of the Society.

I now proceed to the Entomological essay which custom requires of the President on these annual occasions.

SOME ASPECTS OF INSECT LIFE IN NEW ZEALAND.

The choice of the subject of my Address has been determined by two considerations. First of all, nearly twenty

years ago, during my last commission abroad in H.M.S. "Ringarooma," it was my good fortune to spend more than a year in New Zealand waters; to make the acquaintance of many able and enthusiastic entomologists in the Dominion; to consult most of the principal collections of New Zealand insects in the Museums and in private hands; and to carry away with me some of the most pleasant memories of my life, gained in acquiring first-hand experience of these insects in the field. Secondly, this experience has enabled me fully to realise the extreme interest and importance of the entire New Zealand fauna, and the fascinating field of research and speculation as to its origin and affinities, which it presents to the student of the geographical distribution of animal life. On some of these problems I propose to touch, however lightly, in the course of this Address, which in addition may have some little value as a summary of our knowledge of the Entomology of New Zealand, brought up as nearly as possible to the present date.

It has become a common custom to speak of New Zealand as the "Britain of the South," but it would be difficult to find two regions, nearly equal in area and both in the Temperate Zone, more utterly diverse in physical and faunistic conditions. The British Islands are essentially a part of the great Euro-Asiatic continent, from which they were separated as it were yesterday in geological time; and their insect fauna is but a greatly reduced edition of that of Europe, and includes only a very limited number of species which may be regarded as peculiar. New Zealand, on the contrary, has almost certainly not been directly connected with any of the great land-masses since the commencement of the Tertiary period at latest, and it possesses in consequence the most isolated and precinctive fauna of any region in the whole world. From Australia, the nearest land which may be regarded as a continent, the islands are separated by the Tasman Sea, an extent of more than a thousand miles of storm-swept and profoundly deep ocean, and the coast of South America is at least four times as far away across the Pacific. Southwards, a vast expanse of deep ocean, broken only by one or two groups of small islands, extends to the eternal ice of the Antarctic

Continent; and only to the northward do we find evidence of a former connection with other regions, in the submarine plateau included within the thousand-fathom line of soundings which surrounds New Zealand and its satellite islands, extending nearly as far as New Caledonia, and probably indicating the limits of an ancient continent of which these islands are the sole relics at the present day.

New Zealand may on the whole be regarded as an eminently diversified and mountainous land, its highest summit, Mount Cook (Aorangi) in the Southern Alps, attaining an elevation of 12,347 feet; and as the Islands extend over fourteen degrees of latitude, from $34^{\circ} 25'$ to $47^{\circ} 20'$ S., almost every variety of climate except that of the Tropics may be found within their limits. The rainfall varies from about 25 inches per annum in the drier parts of the South Island, to as much as 150 inches in the Sounds on the south-west coast, which are exposed to the full force of the prevailing westerly winds of those latitudes; and with the usually moderate range of temperature, and the general abundance of sunshine, the conditions throughout the Islands are favourable to vegetable life in an eminent degree. The first European visitors found the whole country, except on the higher slopes of the mountains and a few limited lowland tracts, covered with dense forest, which in the dimensions of its individual trees, the luxuriance of the undergrowth, and the profusion of epiphytes, climbing plants and especially of ferns of endless variety and of all sizes, was probably unsurpassed in picturesque beauty and botanical interest anywhere in the Temperate Zone. But over a great area of both Islands this noble forest is but a memory, and has vanished before the axe of the "timber-getter," and even more through the indiscriminate use of fire for clearing the country for agricultural and grazing purposes. In many districts all that remains to tell of its former glories is an occasional decaying log or tree-fern stump on a bare hillside, or a hideous array of miles of charred trunks of once majestic trees, rising from a tangled growth of furze, sweetbriar, and blackberry bramble, more impenetrable than the original "bush" and much more difficult to deal with. In the immediate vicinity of some of the principal towns,

notably at Nelson and Christchurch in the South Island, one may walk for a long distance without seeing a single indigenous plant, so completely has the native flora been ousted by introduced trees, shrubs, and weeds, mostly from our own country. No fewer than 350 species of these intruders were a few years ago enumerated by Mr. T. F. Cheeseman as having become more or less established in the neighbourhood of Auckland,* and many of these weeds grow with a vigour and luxuriance quite unknown in their native land. The disastrous effect on all forms of life of this destruction and replacement of the original vegetation need hardly be enlarged upon, and as it continues at an even accelerated pace, the necessity is only too obvious for immediate and thorough research in what still remains of the endemic animal life of New Zealand, before many of its most interesting forms are lost for ever. Fortunately there is in the Dominion at the present time a small but exceedingly capable body of Entomologists who are fully alive to the urgency of the matter, and the number of new and interesting forms in all Orders of insects brought to light by them in recent years bears ample testimony to their successful exertions. Even near the larger towns, notably at Dunedin, where a wide belt of "bush" surrounding the city has been specially reserved, some patches of the original woodland have escaped the general destruction, and still give shelter to many interesting insects and other forms of indigenous life.

The New Zealand forest is mostly evergreen in character, and thus varies but little in aspect at different seasons of the year. In many parts, especially at low elevations, it is largely composed of four or five noble species of Coniferous trees, chief of which is the famous "Kauri," one of the most magnificent timber trees in the world, but now rapidly approaching practical extinction, and found only in the northern half of the North Island. In the less settled parts of the Dominion, and in particular on the flanks of the mountain ranges, large stretches of forest still remain practically in their primeval condition, the subalpine scrub being of an exceedingly dense and impenetrable character, but containing

* Transactions, N.Z. Institute, XV, pp. 268-298.

many fine and curious flowering shrubs, some of which are now well known in cultivation. Towards the west the prevailing trees are several species of *Nothofagus*, a very interesting group of small-leaved, mostly evergreen beeches, miscalled "birch" in New Zealand, and "myrtle" in Tasmania. Trees of this genus are also predominant in the forests of Western Tasmania and Western Patagonia, to which they impart a characteristic aspect in common with those of New Zealand; and their present-day distribution strongly suggests the common origin of these widely-dispersed trees in a long-vanished sub-Antarctic land.

Comparatively few of the trees and shrubs in the lowland forests have conspicuous flowers, with the exception of the genus *Veronica*, which here includes trees of considerable dimensions, and the Myrtaceous genus *Metrosideros*, in which are some fine timber-trees as large as English oaks, whose many-stamened crimson and pink blossoms are in their season a most beautiful and conspicuous feature of the "bush." Where not actually under cultivation, the open ground unoccupied by forest is, in the North Island, covered in great part with a dense growth of "manuka" or "tea-tree" (*Leptospermum*), a Myrtaceous shrub or small tree whose profuse and fragrant white blossoms rival those of the Hawthorn in their attractiveness to insects; or with a robust variety of our bracken (*Pteris aquilina* var. *esculenta*), the rhizome of which in old times formed an important item in the food-supply of the Maoris. In the South Island are wide expanses of level or slightly undulating land, sometimes many miles in extent, and covered with tall grass growing in definite "tussocks," other vegetation being usually little in evidence. This "tussock-land," which forms the finest of pasture, extends in places far up the mountain-sides, where, above the "timber-line," an Alpine flora exceedingly rich in species, and including many of the most remarkable and beautiful plant-forms of New Zealand, is found up to the limits of perpetual snow.

The diversified surface, the favourable climatic conditions, and the luxuriant vegetation of these beautiful Islands, at once suggest the existence of a profusion of species and

individuals in all Orders of insects; and in the light of our present knowledge, it is a little difficult to realise the opinion which prevailed up to quite a recent date, that New Zealand possessed probably the poorest and most limited insect fauna of any land of the same extent. Even as late as 1876, we find so eminent an authority as Mr. A. R. Wallace writing of its "excessive and most unintelligible poverty in insects,"* and further on in the same great work,† he is disposed to attribute this poverty to the deficiency of the flora in gaily-coloured and conspicuous flowers—a deficiency by no means as great as was then generally supposed. And an excellent Entomologist, the late Prof. F. W. Hutton, writes as follows in 1873—"No New Zealand naturalist who has collected insects on however small a scale in Europe can I think fail to be struck with the paucity in New Zealand, not only of species, but in some Orders of individuals also. . . . On entering the bush, instead of finding the masses of decaying wood and leaves swarming with life, we hardly find a living creature, while at the same time we are attacked by myriads of blood-thirsty mosquitos (*Culex acer*). It would certainly seem that abundance of food does not produce abundance of individuals in some Orders (e. g. *Coleoptera*), neither does an absolute dearth of food in the imago state prevent the increase of individuals in others (e. g. *Diptera*)."[‡] Another good observer, Mr. C. M. Wakefield, states also at about the same time—"3000 species of *Coleoptera* have been found in Great Britain, and although I cannot say how many New Zealand species have been described, yet I do not think the number can possibly exceed 500. When, therefore, we consider what a diversity of climate and surface these islands present, it is obvious that there is ample scope for further investigation. Not only are our species few in number, but the individuals composing them are small and inconspicuous, and singularly destitute of brilliant colouring. The same dull and sombre hue so characteristic of the vegetation of New Zealand extends itself, with but few exceptions, to its fauna."§

The reason for this striking under-estimate of the richness

* Geog. Distribution of Animals, I, p. 450.

‡ Trans. N.Z. Inst., V, p. 246.

† Id., pp. 460-63.

§ Id., V, p. 297.

of the New Zealand insect fauna is not far to seek, for it is undoubtedly due to the fact that its great interest and importance were until quite recently not realised by entomologists in general, previous to which a certain lack of superficial attractiveness in the insects as a whole had led to their being somewhat neglected by collectors, professional and otherwise. The close research and observation carried out during the past thirty years by the resident entomologists of New Zealand, with the aid of such capable visitors from England as Mr. E. Meyrick and others, have completely dissipated the idea of an insect fauna unduly poor in number of species. But these researches have emphasised the isolated and distinctive character of the fauna, by revealing the striking inequality in the representation of the different Orders of insects, and the entire absence in all, of a great number of groups otherwise of almost universal distribution. Indeed, it may be said that the interest of the New Zealand insect fauna as a whole consists almost as much in its deficiencies, as in what it includes.

Comparatively few of the New Zealand insects are of diurnal or obtrusive habits, and their general apparent scarcity in species at any rate, is very evident to the ordinary collector, as indeed it was at first to myself. A very large number of insects in all Orders, especially in the Coleoptera, are most efficiently protected from casual observation by their inactive and retired habits, and even more by the eminently cryptic nature of their form and colouring, which harmonise in a greater degree with their special surroundings than is probably the case with the members of any other fauna. Very many species are exceedingly local, and confined to a very small area, and a large number of the finer forms now known have been recently obtained from mountain localities more or less difficult of access. When, however, the entomologist from England has realised the peculiar conditions under which most of the endemic insects live, he will find collecting fully as pleasant and remunerative as at home, though it may call for a greater amount of acumen and perseverance.

In the neighbourhood of the larger towns, the insects introduced accidentally or of set purpose from our own coun-

try, such as the hive-bee, the humble-bees of three or four species which were imported with much difficulty some fifty years ago, and which now abound everywhere, the blow-fly *Calliphora erythrocephala* Meig., and the drone-fly *Eristalis tenax* L., intrude themselves on the notice of the entomologist much more than is the case with the endemic insects of the Islands. They are, in fact, fully as much in evidence as the swarms of sparrows, greenfinches, linnets and starlings which have everywhere replaced the far more interesting small native birds, except in the recesses of the "bush" remote from cultivation.

The history of the progress of our knowledge of the Coleopterous fauna of New Zealand is very interesting. The first small collection brought to England, which, however, included several of the largest and most conspicuous species, was made during the memorable first visit of Capt. Cook to the islands in 1769-70; and many of these insects, which were described by Fabricius, still exist in the Banksian Collection in the Natural History Museum at South Kensington. Little or nothing was added to our knowledge until 1841, when some beetles were collected at Akaroa, Port Chalmers, and the Auckland Islands by the French expedition to the South under Capt. Dumont d'Urville; and a few were also obtained at the Bay of Islands in the North Island by the naturalists of our own Antarctic ships commanded by Capt. Sir James C. Ross. These latter insects, with a few more from other entomologists, among them Charles Darwin in the "Beagle," were described by Adam White in 1846 in the "Zoology of the Voyage of H.M. Ships Erebus and Terror," about 150 species of Coleoptera being then known from New Zealand. A small collection from the Christchurch district, sent home in 1867 by Mr. R. W. Fereday, was described in the "Entomologist's Monthly Magazine" of that year by Mr. H. W. Bates; and from this date the serious investigation of the New Zealand Coleoptera may be said to have commenced. Several valuable papers by the late Prof. Hutton, Capt. T. Broun, Mr. C. M. Wakefield, and other entomologists resident in New Zealand, as well as by Mr. F. P. Pascoe and Dr. D. Sharp, appeared between 1873 and 1884, mostly in the Trans-

actions of the New Zealand Institute; and in 1885 the last-named eminent Coleopterist, in the Transactions of the Royal Dublin Society,* made what was up to that time by far the most important contribution to our knowledge of the New Zealand beetle-fauna, mainly based on a very large collection from the South Island received from Mr. R. Helms of Grey-mouth. In this fine paper, to which I am greatly indebted, Dr. Sharp estimates "that New Zealand will be found to possess somewhere between 3000 and 3500 species of Coleoptera," a prediction which has been more than fulfilled. Prior to that date, however, Captain (afterwards Major) T. Broun, whose decease we have quite recently had to deplore, had issued at Wellington in 1880 the first part of his "Manual of New Zealand Coleoptera," in which 1141 species were enumerated. This work, although in parts decidedly open to criticism, has been of very great value to every one interested in the entomology of New Zealand; and to the end of his long life the author continued, almost single-handed and under many difficulties, to describe the multitude of hitherto unknown forms brought to light by his own researches and those of the other Coleopterists resident in the Dominion. The endemic members of several important families, such as the *Byrrhidae*, the *Cossonides*, and especially the *Pselaphidae*, have been revised by him in quite recent years. Just before his lamented decease, Prof. F. W. Hutton in 1904 published his exceedingly useful "Index Faunae Novae Zealandiae," which includes a complete catalogue of the insects as known up to that date, and enumerates 2735 species of Coleoptera as occurring in the Islands. At the present time about 4000 species, a number considerably in excess of that of our British beetles, are known to inhabit the New Zealand Region, and these are comprised in nearly 700 genera.

The unequal representation of the New Zealand insects is in no Order so strikingly evident as in the Coleoptera. Thus the important families *Cetoniidae* and *Cassididae* are entirely absent from the fauna; and only four small species of the *Buprestidae*, so abundant in species and individuals in Australia, have as yet been found in New Zealand. The

* New Series, Vol. III, pp. 351-452, plates XII, XIII.

great group of true dung-beetles, as might indeed have been expected in the case of a region which in all probability has never supported any terrestrial Mammalia except two small species of bats, are here represented only by a very few small forms of *Saphobius* (*Copridae*) and *Ataenius* (*Aphodiidae*), which are found under bark and in vegetable refuse. The very curious little blind Aphodiid *Phycochus graniceps* Broun, which lives in the sand under half-buried logs at high-water mark on the coasts, has, singularly enough, been found under similar conditions in Tasmania, in company with another member of the genus. The *Dytiscidae* number only sixteen species, and only one of these, the rare *Homocodytes* (*Cybister*) *hookeri* White is of large size; our familiar *Rhantus pulverosus* Steph., whose range extends from our own islands to Tongatabu in mid-Pacific, being of very common occurrence. The *Chrysomelidae* again are few in species, except perhaps in the Galerucine genus *Luperus*, and they do not present a single form of large size or striking appearance. On the other hand the *Cicindelidae*, *Hydrophilidae*, *Staphylinidae*, *Lucanidae*, *Elateridae* and *Dascillidae*, as well as the *Heteromera*, are relatively much better represented, and the Longicornes can boast of some 220 species, a large number for a temperate region, though only two of these, *Prionopus reticularis* F. and *Ochrocydus huttoni* Pasc., both among the most conspicuous of New Zealand insects, represent the large section of the *Prioninae*. The *Carabidae*, of which, however, the first sub-family (*Carabides*) has for its sole exponent the very anomalous *Amarotypus edwardsi* Bates, forms one of the largest and most important elements of the Coleopterous fauna, being only exceeded in this respect by the *Curculionidae*, of which family more than a thousand species are now known from the New Zealand region. The sub-family *Cossoninae*, which is characteristic of insular insect faunas in an eminent degree, is here developed to an extent proportionately exceeded elsewhere only in the Hawaiian Islands and in St. Helena. A single tree, the Nikau (*Rhopalostylis sapida* Sol.), the sole endemic palm, supports an interesting series of some eight or ten species included in four genera, and other remarkable forms of the sub-family are restricted to the tree-ferns

(*Cyathea*) and to the so-called "native flax" (*Phormium tenax* Forst.). A single species of the curious genus *Rhynchogonus*, whose head-quarters are in the Hawaiian Islands, has been found in New Zealand, and another has recently been met with in the Kermadec Islands to the northward. The *Cryptorrhynchina* are also very fully represented, especially *Acalles* and the allied genera, which include some very fine endemic forms. There are five species of the small but remarkable family *Rhysodidae*, a large number for a single limited region, and one of the very few members of the very aberrant family *Aglycyderidae* (*A. collastoni* Sharp) is found rarely on the tree-ferns, the only other two species occurring in such remote localities as New Caledonia and the Canary Islands. The *Anthribidae* also include a considerable number of interesting insects, nearly all, however, being of small size; and in the *Colydiidae* and the *Psclaphidae* especially, the industrious researches of the present school of New Zealand Coleopterists, notably among them the late Major Broun, have revealed a wealth of species probably unequalled anywhere else in the world in singularity of form and diversity of structure.

COMPARATIVE TABLE OF REPRESENTATION IN CERTAIN GROUPS OF COLEOPTERA

Family or Section.	New Zealand (1000 species).		British Islands (3429 species).		Hawaiian Islands (1707 species).		St. Helena (129 species).	
	Genera.	Species.	Genera.	Species.	Genera.	Species.	Genera.	Species.
Cicindelidae	1	19	1	5	—	—	—	—
Carabidae	55	483	70	316	36	204	1	14
Dytiscidae	7	16	18	107	—	—	—	—
Psclaphidae	23	318	13	36	—	—	—	—
Colydiidae	27	171	15	19	1	1	—	—
Lucanidae	4	35	3	3	1	7	—	—
Cerambycidae	51	224	32	55	5	52	—	—
Phytophaga	17	139	52	247	—	—	1	3
Curculionidae	193	1049	96	476	12	132	15	65
(Apionides)	1	1	1	80	—	—	—	—
(Cossonides)	51	160	7	9	13	89	13	54
Anthribidae	9	73	5	8	—	—	3	26

In this connection it may be interesting to compare the representation of some of the principal families and sub-

families of Coleoptera in New Zealand with that of the truly endemic members of the same groups in two equally pre-cinctive and peculiar insular faunae which have been about equally investigated, and with the same groups as found in the British Islands.

The great majority of the New Zealand beetles are of moderate or quite small dimensions, and are characterised rather by endless diversity of form and sculpture than by bright or conspicuous colouring. The largest beetle of the Islands, *Prionoplus reticularis* F., slightly exceeds our *Prionus coriarius* in size, and the single representative of the *Brentidae*, *Teramocerus* (*Lasiorrhynchus*) *barbicornis* F., of which the male is often more than three inches in total length, is one of the finest and largest of the family, as well as one of the most remarkable and conspicuous insects in the fauna of the Islands. But there are, after all, a good many exceptions to the general dullness. The large metallic-green and coppery species of *Trichosternus* and *Zaeopoeilus* rival many of the European *Carabi* in size and brilliancy of colour, and another fine and very characteristic genus of the same family is *Mecodema*, of which nearly sixty species are now known from New Zealand, only two or three others occurring in Australia and Tasmania. These are black or dark bronzy beetles of varied and often elegant sculpture, the finest, *M. costellum* Broun, coming from Stephens Island in Cook's Strait, where also the largest species of the endemic Tenebrionid genus *Cilibe* is found. In the rich green flower-frequenting species of *Rygmodes* we find a brightness of colouring quite unusual in the *Hydrophilidae*, and the little "chafers" of the genus *Pyronota*, some of which are most abundant in summer on *Leptospermum* and other blossoms, yield to very few of their tribe in beauty of metallic colour. Their larger relative, the exceedingly rare *Poecilodiscus pulcher* Broun of the mountains of the South Island, is even more brilliant, and the largest Buprestid, *Nascio enysii* Broun, is also a charming little beetle. Among the *Elateridae* are some quite fine insects, one of the most singular being the large flattened *Psorochroa granulata* Broun, which is found rarely in crevices of rocks near the sea in some of the small off-lying islands; and the

Cleridae also include some very pretty little insects. Few Longicorns for their size exceed in elegance of form or beauty of subdued colour such species as *Heratrichia pulverulenta* F., *Coptomma variegatum* F. (both of which, like *Terauocerus barbicornis*, have in recent years become very much less common than formerly), the apple-green *Calliprason sinclairi* White, and especially the little flower-frequenting members of the genus *Zorion*; while the large and rare *Blosyrops spinosus* Redt. of the South Island is one of the most quaint-looking beetles even in New Zealand. It is in the *Rhynchophora*, however, that we find the most singular and diversified forms of the endemic Coleoptera. The members of the small sub-family *Scolopterinae* (*Nyctes*, *Ancistropterus*, *Scolopterus*, etc.) present a little assemblage of knobbed and spinose weevils of most distinctive appearance, quite unlike any forms from elsewhere, and the species of *Stephanorhynchus*, *Hoplocneme*, and *Rhadinosomus*, to name only a few, are hardly less bizarre in aspect. Metallic or bright colours are rare in this family here, but a large number of species are of neat and attractive appearance, and the members of the genera *Rhynchodes*, *Agathinus*, *Lyperobius*, *Phaedrophilus*, and some other forms recently discovered in the mountains of the South Island at considerable elevations, are decidedly handsome insects.

Comparatively few of the beetles are individually numerous, the *Cicindelidae* forming one exception; *Cicindela tuberculata* F. in the North Island, and *C. latecineta* White in the South, are to be seen everywhere on roadsides and dry banks in summer, and are familiar to the youth of the Dominion under the curious name of "New Zealand bees." Only a few species may be regarded as in any way injurious to agriculture or otherwise, but the brilliant little "chafer" *Pyronota festiva* F. has been known to work considerable havoc with the blossoms of fruit-trees, and cereal crops and pastures are sometimes greatly damaged by the larvae of one or two species of the Melolonthid genus *Odontria*. The huge white larvae of *Prionoplus reticularis*, called "luhu" by the Maoris, and greatly esteemed by them as an article of food, live in the timber of the Kauri and other Conifers, but the trees are probably

attacked by the beetle only when they are in a state of incipient decay. Another of the larger Longicorns, *Aemona hirta* F., is sometimes destructive to orange and lemon trees in the North Island, as well as to the Puriri, or New Zealand teak (*Vitex littoralis*). This valuable timber tree is also subject to the attacks of the larva of the large Hepialid moth *Charagia virescens* Doubl., and sound logs are in consequence often difficult to obtain. Two weevils, *Mitrasethus bituberculatus* F. and the Cossonid *Xenocnema spinipes* Woll., are also at times somewhat injurious to Kauri and other Coniferous timber, and at Reefton, a mining town in the South Island hastily built of "Kahikatea" or so-called "white pine," I found that two or three of the native species of Cossonides, associated with incredible numbers of our familiar *Anobium domesticum*, had practically eaten up many of the houses, through the planking of which it was quite easy to thrust one's finger in places.

Like the Coleoptera, the Lepidoptera of New Zealand were for a long period regarded as being exceedingly poor in species, and generally of somewhat unattractive appearance. It cannot be denied that the butterflies and moths of the Islands include few forms of large size or bright colours, and that, as with the beetles, many groups of otherwise world-wide distribution are here strikingly deficient or entirely absent. But during the last half-century the number of known endemic Lepidoptera has been very greatly augmented by the researches of such diligent resident entomologists as Mr. C. M. Wakefield, Mr. R. W. Fereday, Prof. Hutton and Mr. G. V. Hudson, whose finely illustrated and most useful work "New Zealand Moths and Butterflies," published in 1898, marks an era in the study of the fauna of the Dominion. Even a greater debt is owing to Mr. E. Meyrick, who resided and collected actively in New Zealand for some years. Besides publishing the descriptions of a multitude of hitherto unknown species, chiefly in the "Transactions of the New Zealand Institute," he has in the same journal, between the years 1910 and 1917, revised and brought up to date our knowledge of nearly all the principal sections of the Order, as represented in the region. The extreme importance and interest of the

New Zealand Lepidoptera from an evolutionary standpoint, as well as of their geographical relations with the insect faunae of other regions in the Southern Hemisphere, are clearly shown in this series of masterly papers, my indebtedness to which in this Address I here gratefully acknowledge.

The number of species of Lepidoptera at present known from the New Zealand region reaches the respectable total of 1078, and their distribution among the principal sections of the Order is shown in the following Table.

TABLE OF NEW ZEALAND LEPIDOPTERA

Division or Family.	No. of		Endemic.	
	Genera.	Species.	Genera.	Species.
Rhopalocera	9	15	4	10
Sphingina	2	2	—	—
Arctiidae and Hysidae	3	5	1	4
Noctuidina	26	109	8	93
Geometrina	28	219	9	210
Pyralidina	33	216	12	204
Tortricina	19	115	7	109
Tineina	95	364	37	344
Psychidae	2	2	1	2
Hepialidae	2	18	1	18
Micropterygidae	3	13	2	13
Total	222	1078	82	1007

Even in comparison with the general paucity of butterflies in the extra-tropical regions of the Southern Hemisphere, the number of species found in New Zealand is exceptionally small for its area. Only fourteen species (or fifteen if we include the intrusive and perhaps not fully naturalised *Danaida plexippus* L.) may be regarded as permanent residents; and these belong to only four main divisions, the almost universally distributed *Papilioninae*, *Pierinae*, *Erycininae*, and *Hesperinae* being totally unrepresented. Three of the five *Vanessids*, *Precis cillida* F., *Pyrameis itea* F., and the almost ubiquitous *Pyrameis cardui* L. (var. *kershawii* McCoy), are well-known Australian forms, and the irregularity of their occurrence in different years suggests the probability that in

New Zealand their numbers are at times reinforced by migration from that continent across the Tasman Sea, with the aid of the prevailing strong westerly winds of those latitudes. One of the *Lycaenidae*, *Zizera labradus* Godt. (*Lycaena phoebe* Murray), is widely distributed throughout Australia and the Pacific Islands. The remaining ten species form a little endemic group of exceptional interest. The most showy butterfly is the beautiful *Pyrameis gonerilla* F., which represents our "Red Admiral" in the Dominion, and greatly resembles it in appearance and familiar habits; its larva, too, feeds in a closely similar manner on the big shrubby nettle *Urtica ferox*, in little tents made of leaves spun together. It is generally common throughout New Zealand, from the North Cape to Stewart Island, and is represented in the Chatham Islands by the closely allied *P. ada* Alfken. Three pretty species of *Chrysophanus* are also widely distributed; *C. salustius* F. is the commonest of these, the more handsome *C. feredayi* Bates being somewhat more local, and the larvae of both species may be found feeding on the imported sorrel in the same way as that of our *C. phlaeas*. The little purple-flushed *C. boldenarum* White occurs, sometimes abundantly, in dry stony places and shingly river-beds, and the inconspicuous *Lycaena oxleyi* Feld. is usually met with in similar situations.

By far the most interesting butterflies in New Zealand are the four endemic species of *Satyridae*, each one being the sole representative of its genus. *Dodonidia helmsi* Fereday, a somewhat rare and very richly coloured insect, flies in February in sunny openings in the forests on both sides of Cook's Strait, usually at a considerable height above the ground, and its capture is thus by no means easy; the food-plant of its larva is the large sedge or "cutting-grass," *Galvinia setifolia*. The other three species are, so far as is known, entirely confined to the South Island. *Argyrophenga antipodum* Dbld. is the characteristic butterfly of the "tussock-lands," its range extending from near sea-level to upwards of 4000 feet, and where it occurs it is often very abundant. The underside of the wings of this butterfly, with its longitudinal silvery stripes on a ground-colour of soft ochreous-

brown, is very conspicuous in the cabinet; but when it is at rest at the bottom of a "tussock," these markings harmonise most perfectly with the lights and shadows of the yellowish grass-stems, and in this environment the insect presents as complete and beautiful an example of protective resemblance as our own "Orange-tip" on its favourite white Umbelliferous flowers. *Pernodaimon (Erebia) plato* Fereday is in appearance and structure, as well as in habits, wonderfully like some of the black *Erebias* of the European Alps, and is fairly widely distributed and sometimes common on shingly mountain slopes at elevations between 4000 and 6000 feet. As I have unfortunately no practical experience of this mountain butterfly, I cannot refrain from quoting the very interesting remarks of Mr. H. Hamilton on the habits of the insect as observed by him in its native surroundings.* "*Erebia plato* can only be located when the sun is shining strongly and continuously. This beautiful black butterfly is then to be seen hovering over the shingle-slips, and apparently following well-defined air-tracks. It was noticed that the best way to capture them was to sit close to a place they had been seen to pass, and keep perfectly still. Presently one would come sailing along, and apparently not notice the collector. A very quick movement with the net was necessary to catch the insect, and if you missed the first stroke the chances were all on the butterfly escaping. On being disturbed they make rapid jerky upward movements, and soon get out of the danger-zone, flying away to some other slope. As soon as the sun is obscured by a cloud all the butterflies alight and remain motionless until the sun shines again. As sunshine is the exception rather than the rule on these mountaintops, *Erebia*-hunting is very trying to the patience."

Erebiola butleri Fereday is also restricted to similar high altitudes, but is a much more local and less common insect than *P. plato*. To quote Mr. H. Hamilton again:† "As a rule, the habits of the *E. butleri* are sluggish, and it does not make long flights; it frequents some particular tussock-clump and flutters about there. The position of the female is generally indicated by watching the movements of the males,

* Trans. N.Z. Inst., XLIII, p. 117.

† L.c., p. 122.

and noticing where they hover for a longer time than usual. During the bright sunshine the male *butleri* is seldom ever seen at rest, and appears to fly backwards and forwards along well-defined routes within certain natural boundaries. This 'trade-route' habit is specially characteristic of *E. pluto* also."

In addition to the endemic butterflies of New Zealand, several wanderers from other regions have occasionally been found within its limits. Writing as long ago as 1855, the Rev. Richard Taylor, in his very interesting work "Te Ika a Maui," mentions "a fine large butterfly, closely resembling the English Purple Emperor," as being found in the Middle (South) Island; and in the second edition of the book, published in 1870, is a tolerable coloured figure of the male of *Hypolimnias bolina* L. under the Cramerian name of *Diadema auge*. This butterfly has been taken not unfrequently in recent years, and the large size and fine colouring of the specimens, notably of the female figured by Mr. Hudson in "New Zealand Moths and Butterflies," would appear to point to North Australia as their place of origin. *Linnaea chrysippus* L., *Catopsilia catilla* Cram., and an unidentified species of *Euploea* are exceedingly rare visitors, also in all probability from Australia. More difficult of explanation is the undoubted occurrence, at Wellington in 1881,* and at Orepuki, at the south extremity of the South Island in 1903,† of several specimens of our *Pyrausta atalanta*, whose nearest station, to which it has found its way from North America, is in the Hawaiian Islands, at least 4000 miles distant from New Zealand. Even more inexplicable is the reported capture of *Aglais urticae* at Wellington, at the same time as that of *P. atalanta*, by Mr. T. Kirk; and I understand that even our *Pieris rapae* has on one occasion been observed at this port, having almost certainly been brought thither by chance in one of its early stages.

The powerful flight and wandering propensities of the *Sphingidae* have carried certain species of the family to some of the most remote oceanic islands, but only two have been observed in New Zealand. These are *Herse convolvuli* L.,

* Trans. N.Z. Inst., XVI, p. 550.

† Id., XXXVI, p. 161.

which, although by no means generally common, appears to be fully established in the Islands; and a few examples of the almost equally widely-ranging *Hippotion celerio* L. have been met with in recent years. The great assemblage of moths included under the obsolete but in some respects convenient name of the *Bombycina* are all but unrepresented in the fauna, several important families, as the *Limacodidae*, the *Lasiocampidae*, and the *Saturniidae*, being entirely absent; the sole representative of the *Hypsiidae* is *Deilemera annulata* Boisd., whose sharply contrasted black and white markings and diurnal flight render it one of the most conspicuous and familiar of the insects of New Zealand. The very few *Arctiidae* include the widely distributed *Utetheisa pulchella* L. which is a fairly frequent visitor and perhaps established in the North Island, and three species of *Metacrias*, an endemic genus probably most nearly related to the South European genus *Ocnogyna*. The males of these are handsome and very active little "tiger-moths," which fly in the sunshine at rather high elevations in the South Island, the females being practically apterous, and covered with a thick coat of yellowish hair-scales.

We have yet another instance of unequal representation in the case of the Noctuid moths. In his "Revision of the New Zealand *Caradrinina*,"* Mr. Meyrick enumerates 97 species, and the researches of the resident Lepidopterists, not forgetting those of our Fellow Dr. G. B. Longstaff,† have added about a dozen more in recent years. Seven of the genera, and a very large percentage of the species, are entirely restricted to the New Zealand region, and the great majority of these are comprised in a single sub-family, the *Melanchrinae*, the genus *Melanchra* alone having no fewer than 37 species. The multitude of diversified forms until recently included under the comprehensive title of the *Quadrifinae* are here represented only by a very few stragglers, chiefly from Australia and the Pacific Islands; and within the limits of the region we also find *Heliothis armigera* Hubn., *Leucania* (*Aletia*) *unipuncta* Haw., *L. loreyi* Dup. (in the Kermadec

* Trans. N.Z. Inst., XLIV, pp. 86-107.

† "Butterfly-hunting in Many Lands," pp. 449, 451, 474.

Islands), *Agrotis ypsilon* Rott., and even our little *Hypenodes costaestrigalis* Steph., all insects of nearly world-wide distribution. A good many of the endemic Noctuae are handsomely marked and attractive-looking moths, though few are of bright colour or more than moderate size; and they share with our species their susceptibility to the attractions of "sugar," which is resorted to by the resident Lepidopterists with as much success as at home.

The Geometrina form an outstanding feature in the Lepidopterous fauna of New Zealand. In number of species they are surpassed only by the Tineina, and in beauty of varied pattern and delicacy of colouring many are excelled nowhere else in the world. In the words of Mr. Meyrick,* "the group exhibits the same inequality of representation of families that has been noticed in the others; three-fourths of the whole number of species belong to the family *Hydriomenidae*, which is very adequately represented, while the *Selidosemidae* and *Monocteniidae* are very imperfectly exhibited, and the other families either wholly absent or indicated only by one or two casually introduced immigrants." The foreign element is here even less in evidence than in any other division of the Lepidoptera, and only some nine or ten of the 219 known species are found beyond the limits of the New Zealand region. A few species occur in open situations, but the greater number inhabit the forest, and in many cases their colour and markings exhibit a beautifully protective adaptation to their environment. The members of the genera *Notoreas*, *Dasyuris*, and *Arctewthes*, are brightly coloured mountain insects which fly in the sunshine up to an elevation of 6000 feet, and are found mostly in the South Island, and the species of *Declana*, which include some of the most handsome of the indigenous moths, are distinguished by their robust build, strongly contrasted patterns, and in the commonest, *D. floccosa* Walk., for extreme variability in colour and markings.

The Pyralidina of New Zealand number 216 species, included in 33 genera, and as pointed out by Mr. Meyrick,† comprise

* Revision of the New Zealand *Notodontina*, Trans. N.Z. Inst., XLIX, pp. 248-273.

† Revision of the New Zealand *Pyralidina*, Trans. N.Z. Inst., XLV, p. 50.

22 per cent. of the entire Lepidopterous fauna, a higher proportion than in any other region. This is mainly due to the enormous development of the *Crambidae*, *Crambus* alone containing 42 species; and especially to that of the genus *Scoparia*, of which no fewer than 92 endemic species are now known. It is only in the Hawaiian Islands, from whence about 60 species have been recorded, that we find this well-marked genus so largely in evidence. Many of the principal families are either absent, or barely represented by a very few stragglers or immigrants, but there are 16 endemic species of the *Pterophoridae*, and the widely distributed *Stenoptilia zophodactyla* Dup. has been found at Wellington. *Pyralis farinalis* L., *Plodia interpunctella* Hüb., and *Meliphora grisella* F. have also been introduced by commerce, and are now established in the Dominion. The Tortricina present a considerable variety of forms, nearly all endemic, but only one of these, *Cacoccia excessana* Walk. appears to be of economic importance, its larva sometimes attacking apricot and other fruit trees. The "Codlin Moth," *Carpocapsa pomonella* L., has been introduced into New Zealand, but fortunately has not there become so great a pest as in Australia and Tasmania.

In his "Revision of the New Zealand *Tineina*,"* Mr. Meyrick remarks that "the *Tineina* usually constitute more than one-third of the Lepidoptera of any given region, and this proportion is apparently maintained in New Zealand." As 364 out of the 1078 species now known from the region belong to this division of the Lepidoptera, this estimate of its representation is very nearly exact. Fully one-third of these, again, are included in a single family, the *Oecophoridae*, and only in Australia does this family bear as large a proportion to the entire Tineid fauna. On the other hand, the extensive family *Gelechiidae* is represented by only a few species, and the *Adelidae*, which Mr. Meyrick says (*l.c.* p. 206) are "an ancient family and present in all the other continental regions (for I consider New Zealand as a continent, or rather the remains of one)" are entirely absent. Our "Currant Clearwing," *Trochilium tipuliforme* Cl. has been introduced, and is now to be found throughout the Dominion; and the cosmopolitan

* Trans. N.Z. Inst., XLVII, pp. 205-244.

Plutella cruciferarum Z. is here, as elsewhere, a serious pest to turnips and other crops of a similar kind.

The *Zygaenidae* are entirely absent, and there are only two species of the *Psychidae*. The large larva-cases of *Oeceticus omnivorus* Fereday are conspicuous on many indigenous and imported trees throughout the Islands, but are said to be less common than in former years. The *Hepialidae* include several fine species, among them the largest Lepidopterous insect of New Zealand, *Charagia virescens* Dbld. This very handsome green moth, whose life-history is fully and admirably detailed by Mr. Hudson in his "New Zealand Moths and Butterflies," is by no means rare, especially in the North Island, though the perfect insect is not often seen, and most of the specimens obtained are bred from the pupa. The larva feeds in the solid wood of living trees, and from its large size is capable of doing a great deal of damage. For a long time this larva was supposed to be the host of the fungus *Cordyceps robertsii*, well known as a curiosity under the name of the "New Zealand Vegetable Caterpillar"; but the ground-feeding larvae of the allied genus *Porina* have recently been ascertained to be the true hosts of this singular parasite. The *Micropterygidae* of New Zealand are of exceptional interest as including, in the genera *Mnemenrecha* and *Sabatinka*, the most ancient and primitive forms of Lepidoptera now existing. A single species of the last-named genus is known from Queensland, but with this exception, the three genera and thirteen species occurring in the Islands are strictly endemic.

In his valuable paper "On the Geographical Relations of the New Zealand Fauna," Prof. Hutton in 1872 wrote as follows *—"The Heteroptera are remarkable for their fragmentary character, and wide distribution. The 13 known species belong to 13 different genera and 9 families; and there are not more than 7 endemic species, three of which have not been properly examined, and may therefore be found to be identical with species inhabiting other countries. . . . In strong contrast to this stand the Homoptera, which include 19 species, of three (*sic*) genera only; *Cicada* having 12, and *Cixius* 7 species." But while a fair number of species have since been

* Trans. N.Z. Inst., V, pp. 247-8.

added, the Heteropterous fauna of New Zealand remains one of the poorest and most scanty of all, and this was certainly my own impression when I was collecting there. As revised by the late Mr. G. W. Kirkaldy in 1909,* the fauna now includes 48 Heteroptera and 39 Auchenorrhynchous Homoptera, and of these some 40 species are endemic. Almost without exception, the forms in the first division are of small size and obscure colouring, but the second includes an interesting series of nearly twenty endemic species of *Melampsalta* (*Cicadidae*) which are a conspicuous feature in the insect life of New Zealand. As in the Hawaiian Islands, there are no endemic *Aphididae*, though some introduced species are now common; but the *Coccidae*, which have been worked out in an admirable series of papers in the Transactions of the New Zealand Institute by the late Mr. W. H. Maskell, number upwards of 90 endemic species, besides a score or more introduced from other parts of the world.

Another very poorly represented Order is the Hymenoptera. As enumerated by Prof. T. D. A. Cockerell,† the *Anthophila* include only 18 species comprised in three genera, *Prosopis*, *Habictus*, and *Paracolletes*, the last-named being common to Australia and New Zealand. Dr. A. D. Forel‡ records 19 species of ants, nearly all of which are endemic; and while the Fossores are not much better represented, and the true wasps are entirely absent, a fair number of the *Parasitica* have been described from the region. With the exception of a single species of *Xiphydria*, the Phytophagous Hymenoptera appear to be entirely wanting; and at present not more than 200 species of the Order in all are known from New Zealand, but further researches are sure to add considerably to this number.

We owe most of our knowledge of the New Zealand Diptera to Prof. Hutton and Mr. P. Marshall; and the Order is, next to the Coleoptera and the Lepidoptera, the most fully represented in the region. It includes some fine and curious endemic forms, the large and very rare Anthomyid, *Ersul singularis* Hutton, from Milford Sound in the South Island, being one

* Trans. N.Z. Inst., XLI, pp. 22-39.

† Proc. Acad. Nat. Sci. Philadelphia, LXVIII, p. 68.

‡ Trans. N.Z. Inst., XXXVII, pp. 353-355.

of the most extraordinary flies known, its very broad and short wings giving it somewhat the aspect of a Stylopod on a large scale; and the larvae of the Mycetophilid *Politophila luminosa* Skuse, which live gregariously in a slimy web on damp banks in the "bush," well deserve the name of the "New Zealand Glow-worm." Although the Maoris assert that mosquitoes were unknown before the coming of the English, the endemic species are quite sufficiently blood-thirsty, though none of them appear to be bearers of malaria; and sand-flies (*Simulium*) are very troublesome in some places, especially in the rainy forests of the South Island.

The few Trichoptera call for little remark, except that the larva of *Philaniscus plebeius* McL. lives among seaweed on the coast between tide-marks, a habit almost or quite unique in the Order. In the genera *Stenosmylus* and *Drepanepteryx*, the Neuroptera-Planipennia includes several endemic forms of great beauty; and in the Odonata, of which ten species, comprised in five families and six genera, are restricted to the region, *Uropetala carovei* White, allied to the equally large Chilean *Phenes raptor*, is one of the finest dragon-flies in the world. Three peculiar species of *Termitidae* are found in New Zealand, but they do no appreciable damage. In the *Ephemeroidea* are one or two exceedingly fine forms, of which the most noteworthy, is *Oniscigaster wakefieldi* McL., with its extraordinary hind-body looking like that of some Crustacean. It is greatly to be regretted that this unique insect, as well as several others of its family, has been practically exterminated by the trout introduced in such numbers into the country during recent years.

Among the most conspicuous and remarkable of New Zealand insects are the apterous forest-crickets of the family *Stenopelmaticidae*, known throughout the Islands by the Maori name of "Weta," and of which some thirty-five species have been recorded. The largest of these, the "Weta-punga," *Deinacrida heteracantha* White, whose body is nearly as bulky as that of a mouse, and whose stout spiny hind-legs are six inches in length, lives in holes in trees in the North Island. It is now extremely rare, having been, it is said, nearly exterminated by the introduced Norway rat, and commands a high

price as a curiosity. The much commoner *Hemideina megalcephala* Buller, which is also reported from Lord Howe Island, is not greatly inferior in size, and the huge head and mandibles of the male give it an equally formidable appearance; and the cave-dwelling species of *Pachyphaua* are noteworthy on account of the inordinate length of their slender antennae. The single Mantid, *Orthoderes ministralis* F., is found also in Australia and Tasmania, and is perhaps a recent introduction, and the *Phasmidae*, of which there are some twelve species, include one or two forms of considerable size. Three or four *Blattidae* at most are indigenous; *Platyzosteria norae-zealandiae* Walk., a highly odoriferous cockroach which abounds under loose bark, is familiar throughout the Dominion under the name of the "Maori Bug." The large and stout *Anisulabis littorea* White is the only common species of the very few endemic *Forficulidae*; our common earwig has gained a footing in a few places, but is by no means the pest that it has become in Tasmania. Finally, the only *Siphonaptera* which are found in New Zealand appear to be the best-known and universal species of the Order, and two others attached to domestic animals. Dr. Dieffenbach, writing in 1843,* states that "the natives say that fleas were introduced by Europeans, and for that reason sometimes call them 'te pakeha nohinohi,' the little stranger," but as early as 1773 the Maori huts at Queen Charlotte's Sound were found by Capt. Cook's sailors to be "exceeding full of vermin and particularly fleas," † and these insects are no doubt coeval with the first human inhabitants of the Islands.

The insect fauna of the outlying islands of the New Zealand region, though as yet imperfectly known, presents many features of great interest. A few insects were obtained in 1909 by Mr. W. L. Wallace from the volcanic but forest-clad Kermadec Islands, some 500 miles north-east of the North Cape. The thirty-eight species of Coleoptera show marked affinity with those of New Zealand, thirteen being described as new by Major Broun. More than half of the 46 species of

* Travels in New Zealand, II, Appendix, p. 201.

† G. Forster, Voyage round the World in H.M.S. "Resolution," I, p. 201.

Lepidoptera, among which are three butterflies, *Melanitis leda* L., *Hypolimnas bolina* L., and *Pyrameis itea* F. are common species of wide distribution; ten are New Zealand forms, and eight are described by Mr. Meyrick as new. The notorious plague-flea, *Pulex cheopis*, has found its way to these remote islands, which swarm with rats; as well as our *Coccinella 11-punctata*, now abundantly naturalised throughout New Zealand.

The larger group of the Chatham Islands is about 450 miles east-south-east of Cook's Strait. They possess a luxuriant vegetation, with a good deal of forest, and the number of resident species of insects at present known will certainly be largely augmented by further research. Besides the butterfly *Pyrameis ada* Alfken, already mentioned, 106 species of Coleoptera have so far been recorded; 49 of these are endemic, the remainder being well-known New Zealand forms. They include 12 Longicorns, three Anthribidae, and eight Cossoninae, and the rare *Acalles fougeri* Hutton, is the largest and finest known member of this extensive genus.

The widely scattered island groups in the stormy ocean south and east of New Zealand, and the solitary Macquarie Island far to the south-west, have in recent years been visited by several naturalists; and the results of the scientific expedition despatched thither under the auspices of the Dominion Government in 1907 are embodied in the two fine volumes entitled "The Subantarctic Islands of New Zealand," published two years later. In this enterprise Entomology was most adequately represented in the person of our Fellow Mr. G. V. Hudson, whose researches, however, were confined to the Snares and the Auckland Islands. Six species of Coleoptera, including a fine new *Mecodema*, were found in the former little group, distant some sixty miles south-west from Stewart Island. From the Auckland Islands, so renowned among botanists for their beautiful and most peculiar Flora, some half-dozen species of beetles were obtained by the French Antarctic expedition under Capt. Dumont d'Urville in 1840; and this number was increased to thirty by Mr. Hudson. Nine additional species were found by Mr. Marriner, another member of the expedition, at Campbell Island, which lies about 180

miles south-east of the Aucklands, and possesses a somewhat similar flora, except that true forest growth is absent. The 46 species of Coleoptera now known from the Subantarctic Islands, the predominant groups of which are the *Carabidae* and the *Rhynchophora*, are referred to no fewer than 26 genera, eight of these being endemic. No butterfly was observed in these islands, and only one Noctuid moth, *Melanchnra erebia* Huds., a species of rather striking appearance; some half-dozen *Geometrac*, and the same number of species of the dominant genus *Scoparia*; a remarkable new Pyralid genus and species, *Protyparcha scaphodes* Meyr., with one or two Micro-Lepidoptera; in all about twenty species, twelve of which are endemic, though obviously allied to New Zealand forms. Except the *Diptera*, of which one or two very remarkable apterous and semi-apterous species were met with, the other Orders are very scantily or not at all represented.

In Antipodes Island, 490 miles east-south-east of the South Cape of New Zealand, Prof. Hutton observed the conspicuous Hysid moth *Deilemera annulata* Boisd.; besides this insect, only three *Diptera* and a bird-bea, *Goniopsylla kerguelensis* Tasch. have been recorded from this lonely speck of land. The even more desolate rocks a little to the northward known as the Bounty Islands, though they are without a trace of terrestrial vegetation, have produced a single Hydrophilid beetle, *Thomosis guanicola* Broun, a remarkable Stenopelmatic cricket *Ischyroplectron isolatum* Hutton, and two or three flies, all living in deposits of seaweed and guano at high-water mark. Macquarie Island, in latitude 54° 30' S. and longitude 158° 50' E., has a fair amount of vegetation, but its only recorded insects are two peculiar species of *Diptera*. The biologists of the recent Australian Antarctic Expedition found "numerous beetles under stones and moss" in this island; these apparently have not yet been described, but cannot fail to be of exceptional interest, and in all probability will prove to be related to the singular forms occurring in Kerguelen Island.

Two islands in a far more genial climate, included in the New Zealand zoological province, remain to be considered. Norfolk Island lies about half-way between New Caledonia and New Zealand, and its fauna and flora, although mainly

Australian in general character, exhibit unmistakable affinities with the latter. These are most pronounced in the case of the endemic birds, but among the Coleoptera are two species of *Xylotoles*, one of the most characteristic of the New Zealand Longicorn genera. Some thirty species of beetles have been recorded, but a much greater number must inhabit an island of such luxuriance and fertility. In Lord Howe Island, which is only 300 miles from the Australian coast, and more than twice as far from the nearest point of New Zealand, about 80 species of Coleoptera, included in no fewer than 68 genera, have been found; among these are two species of *Xylotoles* and two of *Somatidia*, the latter genus being otherwise restricted to New Zealand. Unfortunately the representatives of the other Orders in these very interesting islands appear to be almost unknown, except the butterflies, all of which are of Australian species with the exception of the fine *Pupilio amphiarus* Drury of Norfolk Island, which has its nearest ally in New Caledonia.

It will be evident from this general review that the outstanding feature of the insect fauna of New Zealand is its eminently precinctive and isolated character, which it exhibits in common with all the living productions of the region. The origin and affinities of these have been the subject for many years past of a large amount of speculation and discussion on the part of students of the geographical distribution of animal life; and the general constitution of the fauna may be stated in the words of Prof. F. W. Hutton, one of the most eminent of these *—"The fauna may be divided into a small aboriginal element, including species which have no near relatives elsewhere, and larger Malayan, Australian, and Antarctic elements, as well as several smaller ones. In many cases, however, it is hard to say in which group a species should be placed, for its relations are so widely scattered. Taking a broad view of the whole fauna, however, it may be said that the terrestrial portion is chiefly of Malayan origin, but with rather strong Palaearctic and Neotropical connections." The origin of the aboriginal element may date back as far as the beginning of the Tertiary period, and among the insects it probably includes

* Index Faunae Novae Zealandiae, Introduction, p. 5.

most of the *Colydiidae*, and such forms as *Bronnia*, *Dendrobax*, *Camaius* and others among the Coleoptera, *Oniscigaster* among the *Ephemeridae*, and the very primitive and archaic *Mucemarcha* and *Sabatinea* in the Micro-Lepidoptera, to mention only a few forms. Probably all these are relics of the fauna of a vanished continental land in the South Temperate Zone, of which the site is in part indicated by the relatively shallow soundings of the New Zealand Plateau. This may at some period of its existence have been connected with what is now South America, and by this "land-bridge" the Neotropical element, so plainly indicated in the Fauna and Flora of New Zealand, may have been transmitted. As pointed out by Mr. Meyrick, this affinity between the two faunae is very evident in the principal divisions of the Lepidoptera, and especially so in the *Geometrinae*; and I well remember how much I was impressed, when in New Zealand, with the strong general resemblance of many of the Geometrid moths to those I had made acquaintance with in Chile some twenty years previously. The nearest allies of the remarkable butterfly *Argyrophenga antipodum* are to be found among the Chilean *Satyridae*; and the very distinct Tipulid genus *Macromastix* is also represented in Chile as well as in Amboyna. This last, however, is evidently a form of very great antiquity and wide distribution in bygone ages, as Prof. Cockerell informs me that a species of this genus has been recently detected in a stratum of Oligocene age in the Isle of Wight.

In the three endemic species of *Chrysophanus*, and especially in *Pernodaimon pluto*, which is practically an *Erebia*, we find an unexpected and not easily explicable affinity with the Palaearctic fauna; and a slight relationship with that of the Ethiopian region is indicated in the Histerid genus *Sternaulax*, one of the two species of which is found in New Zealand, and the other in Madagascar. A much larger element appears to have been derived originally from what are now the Austro-Malayan and Melanesian regions by way of extensions northward of the former "Greater New Zealand" as indicated by shallower soundings in this direction. These "land-bridges," however, have long been severed by the subsidence of the greater part of this ancient land, which occurred before many

of the more recently developed forms of life were in existence. The great gaps in the fauna of New Zealand are thus explained, and so great an amount of generic and specific evolution has taken place within its restricted limits since its final isolation, that the affinities already indicated alone remain to tell of the former connections of the Islands with other regions. The surrounding ocean, too, has in recent times proved to be an effectual barrier to the interchange of species. Even in the case of the nearest continental land, though such insects as the strong-winged *Pyrameis idea* and *Precis villida* and a few Coleoptera, chiefly Longicorns and small dung-beetles, have made their way from Australia to New Zealand across the stormy Tasman Sea, probably less than a dozen species of New Zealand beetles have been found in Australia. The *Chrysomelidae*, *Cetoniidae* and *Buprestidae*, which are there so fine and so well represented (one Buprestid genus, *Stigmodera*, alone including no fewer than 420 Australian species), are in the Islands entirely absent or represented only by a few small or obscure forms; and of the numerous and characteristic group of Australian weevils, the *Amycterinae*, only a single species has been found as yet in New Zealand.

Instances of the unique and precinctive character of this wonderful insect fauna may be multiplied as regards all the Orders; but sufficient has been said, I trust, to illustrate its surpassing interest and importance in the scheme of the life-history of our globe, and to emphasise the immediate and urgent necessity of completing our knowledge of the insect life of New Zealand, before many of its most interesting and instructive forms disappear for ever before the march of settlement and cultivation.

It only remains, in concluding this Address, to express my sincere thanks for the uniform kindness and consideration which have been extended to me by each and every Fellow of the Society during the period of my occupation of the Presidential Chair, as well as by the members of the successive Councils during the sixteen consecutive years in which I have had the honour to hold responsible office; and to congratulate the Society on the choice of the distinguished Zoologist whom you have elected as my successor.

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